PROCEEDINGS

OF THE

AMERICAN PHILOSOPHICAL SOCIETY

HELD AT PHILADELPHIA FOR PROMOTING USEFUL KNOWLEDGE.

VOL. XXXVIII. OCTOBER, 1899. NO. 160.

Stated Meeting, October 6, 1899.

Dr. J. CHESTON MORRIS in the Chair.

Present, 8 members.

Correspondence was submitted as follows:

Letters accepting membership were read from Messrs. Arthur V. Meigs, M.D., Henri Poincaré, Charles E. Dana, William Ramsay, Francis C. Phillips, Sir George Otto Trevelyan, Israel W. Morris, A. Stanley Mackenzie, W. A. Lamberton, Waldron Shapleigh, Milton J. Greenman, William C. Day, Samuel M. Vauclain, Harrison S. Morris, Marion D. Learned, Stuart Wood, Henry S. Pritchett, Joseph P. Remington and William Brooke Rawle, and a letter from James E. Keeler declining membership.

A letter from the Connecticut Academy of Arts and Sciences, inviting the appointment of delegates to the commemorative exercises of the one hundredth anniversary of its foundation. The President was authorized to appoint a delegate.

An invitation from the Mayor of Chalon-sur-Saône to send a delegate to the fêtes accompanying the unveiling of the statue of the Egyptologue, François Chabas. On motion the Secretaries were directed to inform the Mayor of Chalon-sur-Saône that the Society had received the invitation too late for its acceptance.

An invitation, also, to the President, from the Committee on the Unveiling of the Monument to Prof. Guiseppe Meneghini, to be present at the ceremony.

A communication from the French Ministry of Commerce,

inviting the attendance of the Society during the Exposition of 1900 at a Congress for the Study of Popular Traditions, and enclosing the proposed programme of proceedings. On motion it was resolved that the President be requested to appoint a delegate to represent the Society in the Congress.

A letter from Mr. A. Radcliffe Grote, in regard to a fossil butterfly described by Dr. H. Rebel, of Vienna, which confirms Mr. Grote's theories as to the Papilionides, and stating that in consequence of Mr. Grote's papers published in the *Proceedings* of this Society, Dr. Rebel, in the edition of Dr. Standinger's European catalogue, will retain the Papilionides at the head of the system.

The deaths of the following members of the Society were announced:

Daniel Garrison Brinton, M.D., of Media, Pa., at Atlantic City, N. J., on July 31, 1899.

Mr. Frank Thomson, of Philadelphia, on June 6, 1899.

Sir William Henry Flower, K.C.B., F.R.S., of London, England, aged 68 years, on July 1, 1899.

Mr. William P. Tatham, of Philadelphia, aged 79 years, at Atlantic City, N. J., on August 5, 1899.

Prof. Robert Wilhelm Eberhard Bunsen, of Heidelberg, Germany, aged 89 years, on August 16, 1899.

Hon. Charles P. Daly, of New York, aged 83 years, on September 19, 1899.

W. G. A. Bonwill, D.D.S., of Philadelphia, on September 24, 1899.

On motion of Mr. Prime, it was

Resolved, That the President be requested to appoint gentlemen to prepare memoirs of Messrs. Daniel G. Brinton, M.D., Frank Thomson, William P. Tatham and W. G. A. Bonwill, D.D.S.

The following papers were read:

"Results Secured at Aransas Pass, Tex., by the Reaction Breakwater," by Prof. Lewis M. Haupt.

"Genealogical Trees of Butterflies," by A. Radcliffe Grote.

"Gold in the Glacial Drift of the Adirondacks," by Mr. Frederick Prime.

HISTORICAL RÉSUMÉ OF THE EFFORTS MADE TO DEMONSTRATE THE PRACTICABILITY OF THE REACTION BREAKWATER AT ARANSAS PASS, TEX., WITH RESULTS TO FEBRUARY, 1899.

(Plates VI–VIII.)

BY LEWIS M. HAUPT.

(*Read October 6, 1899.*)

NECESSITY FOR IMPROVED METHODS.—Inasmuch as this Society has already set its seal of commendation upon a new method proposed nearly thirteen years ago for the alleviation of ocean bars, it becomes a pleasure to complete the record to date by a brief recital of subsequent events. For some years prior to the filing of the theses, for investigation, in the spring of 1887, I was impressed with the serious obstructions and dangers to commerce due to the prevalence of sand bars on alluvial coasts and the unsatisfactory as well as expensive methods in vogue for their improvement.

In fact, the only harbors of importance on our Atlantic and Gulf seaboard which admitted vessels of over seventeen feet draught at M. L. W., south of New York, were Philadelphia, Baltimore, Norfolk, Port Royal, Pensacola and New Orleans, only six in a coast line covering about 3200 miles. The ruling depths on the bars in many of the other inlets was limited to from eight to twelve feet.

The methods of improvement in general use by maritime engineers to-day are the building of two parallel or convergent jetties for the purpose of concentrating the ebb currents upon that portion of the bar included between them and dredging a channel through this protected area, involving large expenditures for construction and maintenance.

HISTORY.—To remove these barriers from our doors a critical examination was made of a large number of special cases both at home and abroad and by comparative studies of local effects, combined with the operation of the general laws of tides and currents, certain deductions were reached as to the causes operating to produce them. These deductions were formulated in the paper entitled "The Physical Phenomena of Harbor Entrances," submitted to the Society in April, and for which there was awarded the highly esteemed Magellanic premium on December 16, 1887.

Encouraged by this substantial recognition of the merits of the invention, I had the honor to submit the plans to the Board of United

States Engineers having general jurisdiction over river and harbor improvements, in January of the following year (1888), with the view to their introduction by the only parties who could use them. The Board, however, made a report on the 16th of March following, concluding in these words: "The views are purely theoretical, are unconfirmed by experience and contain nothing not already well known, which has a useful application in the improvement of our harbors," thus making a direct issue with the conclusions reached by this Society.

On learning of this report, accidentally, some time later and being anxious to confirm "the views" by establishing a precedent, applications were made to several Chiefs of Engineers in succession, on June 30, July 30 and September 14, of 1888, requesting an opportunity to make a demonstration, but without eliciting any response whatever.

This report of the Board was so directly at variance with the conclusions reached by this distinguished Society, and apparently so erroneous as to the observed movement of littoral drift, that a discussion thereof was carefully prepared and read before this Society on January 18, 1889, under the title, "Discussion on the Dynamic Action of the Ocean in Building Bars."[1]

A copy of this paper was likewise mailed to the members of the Board of Engineers, but elicited no reply. On February 24, 1888, the subject was also presented to the Committee on River and Harbor Improvements of the House of Representatives, attracting much interest and close attention, but no action. Thus the efforts to create additional commercial facilities and to demonstrate the truth of a physical law appeared to be thwarted and there remained nothing to do but to await an opportunity.

This did not occur until 1895, or six years later, when the Government decided to concentrate all the appropriations for the West Gulf coast upon the great problem of creating at least one deep-water entrance at Galveston and abandoned the remaining ports to private enterprise.

Then it happened that Mr. George W. Fulton, President of the Coleman-Fulton Pasture Company, and thoroughly familiar with the conditions at Aransas Pass, Tex., from a residence of over fifty years, and Mr. Brewster Cameron, of Tucson, Ariz., succeeded in persuading the Aransas Pass Harbor Company, holding a franchise

[1] See PROCEEDINGS of March, 1889.

from Congress, to undertake the construction of a breakwater on this plan, after all previous attempts had failed to secure increased depth.

ARANSAS PASS.—It may be well to state just here that this inlet opens into Corpus Christi, Aransas, Copanio and Nueces bays, covering in all about 350 square miles of tidal waters; that the mean range of the tide of the Gulf is but fourteen inches, and that for many years the pass has been drifting southwestwardly at the average rate of 260 feet per year. It is now about 175 miles west of Galveston; is the point farthest west on the Gulf coast of the United States where it is possible to create an inner harbor, without great cost and has consequently a larger extent of tributary territory than any other Atlantic port, with the important collateral of giving the shortest transcontinental haul. Its position is therefore strategic, and but for the lack of sufficient water on the bar it should long since have become the great metropolis of the Gulf. The controlling natural depths were from six to eight feet on the site of the recent bar, while at Galveston they were twelve and one-half feet, which gave the latter place the precedence and caused the termini of the transportation routes to be located at that point.

GOVERNMENT EFFORTS.—The superiority of the more western location, however, led the Government to make several vain attempts to secure a navigable channel at Aransas Pass, and as early as January 13, 1853, Lieut. George B. McClellan reported on the pass which was then some two miles east of its present position, and when, in consequence of its steeper slope and more direct discharge, "the depths were about nine feet, but that the channel was constantly shifting." That was a very different pass from the present one and not comparable with it. Fifteen years later (1869) the citizens of Rockport constructed a short wooden spur dike 600 feet long from the shore of St. Joseph's Island on the north side of the pass, which increased the depth two feet, but which disappeared with the destruction of the dike in a few years by storms.

Surveys were renewed by the Government in 1870–71, but no recommendation to improve was made because of the great expense of building a jetty sufficiently strong to withstand the storms of the Gulf because of the alleged existence of quicksands. This it was said was an "insuperable objection to any such experiment." Nevertheless, after eight years more, or in 1879, it was estimated that a channel twelve feet deep might be secured over the bar by

two jetties at a cost of $759,185, and work was actually commenced on this project by the partial construction of the westerly jetty in 1880. The head of Mustang Island was revetted, sand fences built and other work done during the following decade until operations were suspended in May, 1889, after an expenditure of $550,416, with a resulting depth of seven and one-half feet over the bar. In 1887 it was reported to be eight and one-half feet. In the meantime it should be stated that the project was revised in 1887 so as to secure a probable twenty-foot depth. "The original estimated cost of this work as here revised is $2,052,543.72."[1] Work on the Government jetty, which was of mattresses covered with rock, practically ceased about 1885, when it extended seaward including the shore end 5400 feet, and a few years later it was officially reported to have "disappeared," thus confirming the previous opinion as to the difficulties of maintaining such work at that location.

The condition of the bar at the close of the Government work is shown on Plate VI.

PRIVATE EFFORTS.—The years from 1890 to 1895 were spent in experiments by the Harbor Company which was chartered on the 22d day of March, 1890, by the State of Texas, and which secured the passage of an act of Congress, May 12 of the same year, authorizing it to create a twenty-foot channel at Aransas Pass from its own resources. The tribulations of this company and the failure to secure results during the financial depression of those intervening years need not be recorded. Suffice it to say that a contract was made by Mr. Cameron, acting for the Harbor Company, and Charles Clarke & Co., of Galveston, contractors, on the 3d day of July, 1895, to construct only a part of the breakwater on the plans under consideration. The work of placing the foundation mattresses was promptly commenced during the month and vigorously prosecuted. It proceeded so rapidly and was accompanied by such pronounced results that by the end of October it was stated that there were thirteen feet entirely across the bar (see *Report of Board of U. S. Engineers*, Nov. 22, 1897). This without dredging and at an unfavorable season of the year.

UNEXPECTED OBSTRUCTIONS.—It then transpired that the remains of the old Government jetty, which was reported to have "disappeared," were still in place covered with rock, crossing the bed of

[1] *Report of Chief Engineer*, 1887, Part ii, p. 1432.

CONDITION OF BAR OFF ARANSAS PASS AFTER SUSPENSION OF GOVERNMENT OPERATIONS IN 1889.
AUTHORITY, U. S. COAST SURVEY.

the channel and intersecting that portion of the curved reaction breakwater then in place about its middle point (see Fig. 2). It thus acted as a submerged mat or retaining wall to prevent further scour, and as the breakwater subsequently rose, by the deposition of rock, to a plane three feet above the surface a perfect *cul de sac* was formed for the accumulation of sand. The Harbor Company was strenuously urged to remove the obstructing jetty, the existence of which was not suspected, as soon as discovered, but as it had made no provision for this unexpected work either financially or in the contract it was not removed. In consequence a shoal formed reaching to within six and one-half feet of the surface.

THE GOODYEAR CONTRACT AND SUSPENSION OF WORK, MAY, 1897.—This so discouraged the Harbor Company that it was willing to enter into a contract, dated September 12, 1896, with Col. C. P. Goodyear, of Georgia, to complete the entire work and furnish the capital as per an amended agreement dated March 11, 1897. Under these contracts Col. Goodyear exploded 23,350 pounds of dynamite on the old Government jetty and channel between December 18, 1896, and May, 1897, by which he blasted out about 500 feet of the old jetty, thus opening a small breach through which the currents could partially escape seaward, but, being unable to secure the payments, which he had every reason to expect, for work done elsewhere, from the Government, he was obliged to surrender this contract, and since that date, May, 1897, absolutely nothing has been done to create a channel. In fact, so discouraged were the residents of southwestern Texas, as well as the company, that it was decided to request the Government to appoint a Board of Engineers to appraise the work done with a view to its reconveyance to its jurisdiction. Such a Board was appointed by the Honorable Secretary of War June 22, 1897, and submitted its report November 22 of the same year, or only about six months after the work of blasting was suspended, yet it reveals some interesting features to which attention is briefly directed.

REPORT OF THE BOARD U. S. ENGINEERS OF 1897.—It states that between October 30 and November 18 there was "only part of one day that satisfactory soundings could be taken on account of the roughness of the water,"[1] and that this examination gave a depth of eight and one-half feet. The map accompanying this report,

[1] *Vide*, p. 3, Doc. 137, H. R., 55th Cong., 2d Session.

however, shows a channel having a least depth of nine and one-quarter to nine and one-half feet across the bar, which is believed to be a greater depth than had ever existed on the bar in this its most unfavorable position. The *Report*, moreover, states:

"The works built and partially built for the purpose of deepening the channel across this bar have produced no greater depths than were found before these works were constructed."[1]

And again:

"There does not seem any probability that the jetty (meaning breakwater), as now constructed, will of itself secure and maintain any considerable increase of depth in a navigable channel of proper width."[2]

It may seem phenomenal, therefore, that where the eight and one-half feet depth was shown in the chart of November, 1897, there were over twenty-two feet in January, 1899, or an increase of thirteen and one-half feet in a period of as many months, a result which is unprecedented in the annals of harbor improvements, and this without dredging or other assistance, save that derived from the half-completed breakwater reacting upon the partially controlled currents escaping through the breach in the old jetty.

On the other hand, the *Report* states (page 14):

"Since the building of the jetty the position of the channel seems to have become more constant, and, as shown in the following table, the width across the bar to have lessened."

The table referred to shows that between February, 1895, or prior to the beginning of the breakwater, and November, 1897, after work was suspended, the bar had been reduced in width as follows: At the twelve-foot contours the distance across from inside to outside was reduced 550 feet, at the fifteen-foot contours 900 feet, and at the twenty-foot contours by 1600 feet. It is added that "the outside slope has changed but little; . . . . the change has been in the advance of the inner contours." Thus showing that the bar had not advanced seaward, but was eroded on its inner scarp, which is a great desideratum in this class of work. Now, the twelve-foot contours are cut through and but a few hundred feet separate the fifteen-foot contours, if indeed they have not disappeared altogether since the last survey, while there were depths on the bar, under the control of the breakwater,

[1] *Vide*, p. 16, *supra*.

[2] *Vide*, p. 15, *supra*.

reaching to twenty-three feet in January last, and which are probably greater to-day.

The *Report* also states that the Harbor Company has expended on the breakwater about $250,000, which, with the cost of previous work and other expenses, amounted to about $525,000; and the President of the Harbor Company, Mr. Thomas H. Franklin, of San Antonio, in his report to the Board, dated as early as September 7, 1896, says, *inter alia*,[1] in summing up:

"Fifth. Sufficient work has already been done at the pass by the company to demonstrate the entire feasibility of obtaining the necessary depth of water by the expenditure of a practically small additional amount, and the Government has therefore had the problem of deep water solved for it at this port."

That this view seems to be accepted in part by the Board of Engineers would appear from its closing remarks, to wit:

"The Aransas Pass Harbor Company, instead of carrying out the Government plan, adopted one entirely in conflict with it." * * * *

And further:

"This Board believes that with a careful study of the problem a plan of improvement can be devised that will give for a reasonable cost quite a good entrance in which a channel of navigable width with twenty-foot depth at mean low water can be maintained by the aid of inexpensive dredging. Such a plan would doubtless remove a small part of the curved breakwater and utilize the balance. It would cost less than the approved (?) Government plan, but it would not be so good."

And the *Report* closes with these words:

"In consideration of all these facts, the Board is of the opinion that the value to the Government of the works of the Aransas Pass Harbor Company for the improvement of Aransas Pass, Texas, is nothing."

THE ARANSAS PASS HARBOR COMPANY SURRENDERS ITS PROPERTY.—In view of this finding of the Board and the urgent desire of the citizens of southwestern Texas to have the work proceed, the Harbor Company generously concluded to transfer all the work on the breakwater to the Government, as a condition precedent to the early prosecution of the work. This was accordingly done on the 27th day of March of this year.

ESTIMATE OF BOARD OF 1898 AND ACTION OF CONGRESS THEREON.—In the meantime, however, the subject was referred back to a Board

[1] *Vide*, p. 26.

of Engineers by resolution of the Fifty-fifth Congress, third session, which passed the Senate, May 28, 1898, requesting "the Secretary of War to prepare and submit plans, specifications and estimates for the improvement of the harbor at Aransas Pass, Texas."

Two members of the former Board composed the one appointed under this resolution. They reported on December 17, 1898, but the report and estimate were not submitted until the hour of the hearing before the River and Harbor Committee, and then was not read in full. It states that the Board is of the opinion that to secure a 20-foot channel of a width of 150 feet at bottom "it will be advisable to build two parallel jetties and to have recourse to dredging." . . . . Also that "a portion of the old Government jetty and the outer 1000 feet of foundation of the Aransas Pass Harbor Company's jetty must be removed in any case." (See Fig. 1.)

The estimate accompanying this carefully matured plan places the cost of the works at $1,525,000, without provision for maintenance.

Had this plan been adopted it would have destroyed the efficacy of the reaction breakwater almost entirely and would have involved the Government in useless annual expense for maintenance. It was therefore met on the spot by a counter-proposition to complete the existing work as designed, guarantee a twenty-foot channel within two years and secure the Government from loss by filing a large bond of indemnity, conditioned on the payment by the United States of a sum less than one-half the above estimate of the Government's engineers, on the completion of the work. The proposition also included the use of the invention at this place gratis. The committee held it under advisement to be put in legal form, which was subsequently done, but before acting upon it the Government engineers offered to dredge a channel (without guarantees, however, of any kind) for the sum of $100,000. The committee therefore requested my presence when in executive session, and after a brief discussion as to the probable cost of the several parts of the work and the results to be expected therefrom it decided to insert the following item in its bill:

"Improving Aransas Pass, Texas: For *dredging and other* improvement of Aransas Pass Harbor, sixty thousand dollars: *Provided*, That the Secretary of War is hereby authorized to contract for the removal of that portion of the old Government jetty in said harbor from the end nearest the curved jetty constructed by the Aransas Pass Harbor Company to the wreck 'Mary,' in such manner as *to in no wise interfere with*

the curved jetty now located in said harbor: And provided further, That said contract shall not be let by the Secretary of War, nor said work done, until the said Aransas Pass Harbor Company shall have

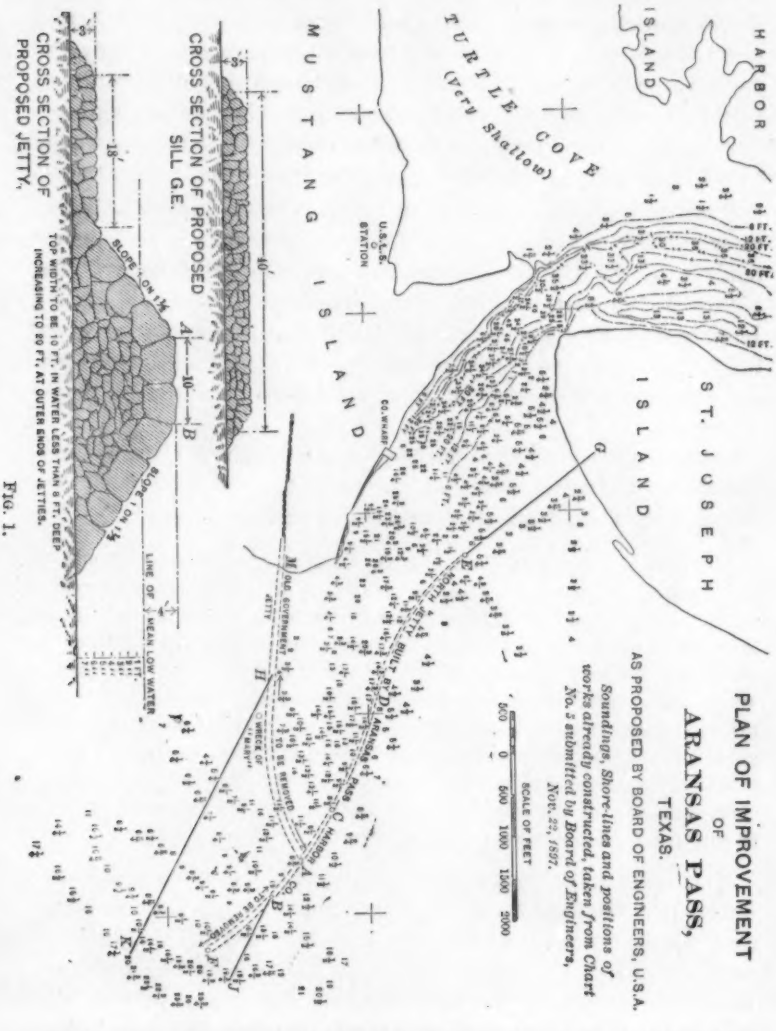

PLAN OF IMPROVEMENT
OF
ARANSAS PASS,
TEXAS.
AS PROPOSED BY BOARD OF ENGINEERS, U.S.A.
Soundings, Shore-lines and positions of works already constructed, taken from Chart No. 2 submitted by Board of Engineers, Nov. 22, 1897.
SCALE OF FEET
600 0 600 1200 1800 2400
HARBOR
ISLAND
TURTLE COVE
(Very Shallow)
MUSTANG ISLAND
ST. JOSEPH ISLAND
U.S.L.S.S. STATION
CROSS SECTION OF PROPOSED JETTY.
CROSS SECTION OF PROPOSED SILL G.E.
TOP WIDTH TO BE 10 FT. IN WATER LESS THAN 6 FT. DEEP, INCREASING TO 20 FT. AT OUTER ENDS OF JETTIES.
SLOPE 1 ON 1½
SLOPE 1 ON 1
LINE OF MEAN LOW WATER
OLD GOVERNMENT JETTY
NEW JETTY
WRECK OF "HARTY"
TO BE REMOVED
CHANNEL 18 FEET DEEP
CHANNEL 20 FEET DEEP
ARANSAS PASS HARBOR CO.

Fig. 1.

properly released and surrendered all rights and privileges heretofore granted to it in said harbor by Congress, also the jetty constructed in said harbor."

THE PLAN SAVED FROM DESTRUCTION.—Thus the integrity of the invention was preserved for the time being from emasculation, and the Government was saved over $1,000,000 by securing the work done by the Harbor Company, without consideration and by avoiding the unnecessary additional work proposed, the effect of which would have been to obstruct the tidal influx and destroy the natural scour. It should be added that during the consideration of this important subject by both Boards, the Consulting Engineers were given no opportunity to be heard, and did not receive a copy of the reports for months after their presentation to the department.

RESULTS OFFICIALLY REPORTED BY THE COAST SURVEY.—Whilst these matters were pending in Congress last winter the Superintendent of the United States Coast and Geodetic Survey, Dr. Henry S. Pritchett, detailed the survey steamer, "Bache," during January and February to make a detailed hydrographic survey of the bar, but the report thereof showing the remarkable results was not available until the end of June, too late to be of service before Congress.

In this report the assistant in charge of the "Bache," Capt. Welker, stated that the weather was so bad as to prevent work on the bar for more than about one day out of each week and also that

"In 1895 the Aransas Pass Harbor Company constructed a jetty in the shape of the letter 'S,' on the north side of the entrance, which is still in existence, and ever since its construction there has been a marked increase in the depth of water on the bar. The present channel crossed the Mansfield jetty, portions of which are still in existence. An attempt was made to remove this by explosion of dynamite, with the result that the rocks scattered over considerable area and without doubt they prevented the current from scouring the bottom to its full capacity." . . . . "It is my opinion that by the completion of the present jetty and the clearing away of the rock in the entrance that a channel of at least twenty feet in depth would soon be secured."

This rapid and progressive deepening of the channel was known in the neighborhood by report of pilots and by the draft of vessels entering the Pass, but does not seem to have merited the attention of the Board in the preparation of its recent plans and estimates. In fact the deepening was so remarkable that many persons were very skeptical as to the facts, and it was therefore necessary to have the official confirmation of the Coast Survey as stated above to verify them.

CONDITION OF BAR AFTER SUSPENSION OF WORK BY THE ARANSAS PASS HARBOR CO.
U. COAST SURVEY, FEB., 1899, SHOWING HALF-COMPLETED BREAKWATER AND OBSTRUCTING, SUBMERGED JETTY.

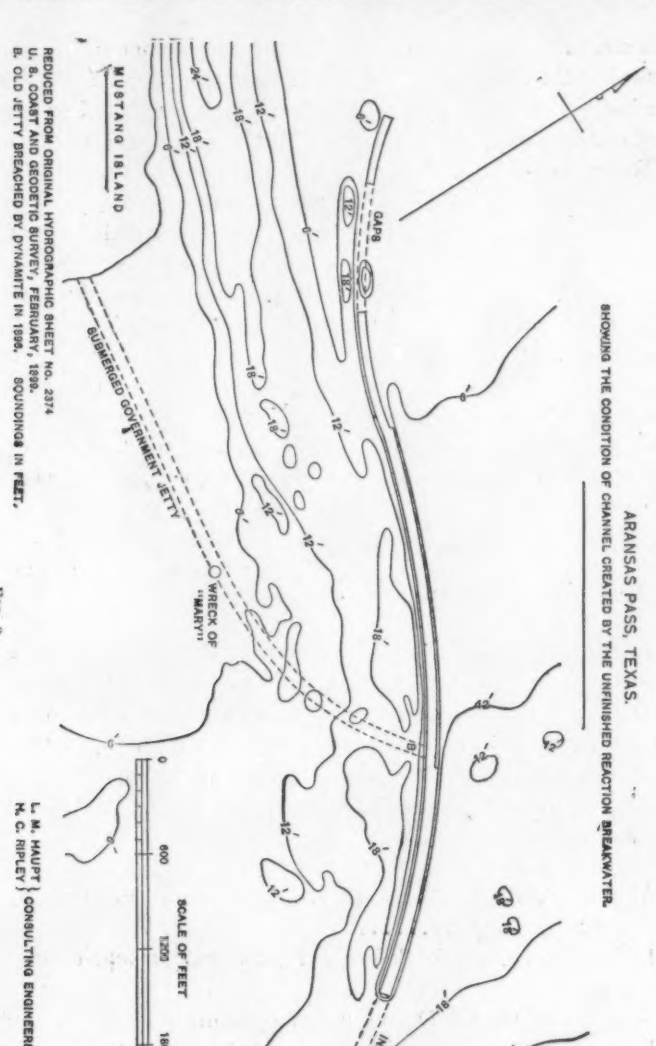


FIG. 2.

THE WORK OF REMOVAL OF THE OBSTRUCTING GOVERNMENT JETTY FINALLY APPROVED AND BIDS INVITED.—The last chapter in

this record is brief, for as yet nothing has been done on the work of removing the obstructing jetty. The act was passed at the close of the last session of Congress, March 4, and after careful and intelligent consideration the Government Engineer of the district, Col. C. S. Riché, son of Prof. George I. Riché, late member of this Society, recommended the letting of the work under the appropriation and provisions as made by Congress. It was authorized July 11, and advertised on September 25 for thirty days, when the bids are to be opened, which brings the chronology of events up to the 30th inst. Additional time will be consumed before the preliminaries are complied with. If there be no bidders, the work must be readvertised. In such case no contractor can transfer a plant to the site much before the winter storms begin which involve serious loss of time and increased cost for the Government, or loss to the contractor. Even after the removal of the old jetty time will be required for the currents to adjust themselves to the new regimen and demonstrate their ability to enlarge the channel. These delays therefore will doubtless retard greatly the development of the channel at this important entrance on the West Gulf coast.

THE PROGRESSIVE DEEPENING PRODUCED BY THE BREAKWATER WITHOUT DREDGING OR OTHER AID.—In conclusion it remains only to state that this half completed, single breakwater has so far controlled the ebb currents as to have removed from the channel by their own energy some 400,000 cubic yards of compact, sandy material, and to have produced a progressive improvement of depths, as follows:

	FEET.
August 28, 1896. After suspension of work on breakwater by company	6.0
December 10, 1896. Before old jetty was breached the depth was	6.5
February 2, 1897. During use of dynamite	8.0
June 8, 1897. After work was suspended	8.75
November 5, 1897. Without further aid from any source	9.25
February 5, 1898. An examination with lead line gave	10.0
June 15, 1898. Pilots reported	11.0
August 29, 1898. Pilots reported and added, "The S. E. wind this summer did not fill it up as it usually does."	12.0

PROBABLE CONDITION OF BAR TO BE EFFECTED BY THE COMPLETION OF THE REACTION BREAKWATER AND REMOVAL OF OBSTRUCTING JETTY.

	FEET.
January 4, 1899. Telegram announced (on pilot's range)	13.3
February 11, 1899. Capt. Welker wired the Coast Survey office	15.0

ECONOMY AND DEPTHS UNPRECEDENTED.—So that in two years there was a gain of eight feet produced by a half-finished structure in the face of serious obstructions at a cost of less than $30,000 per foot depth as compared with from $200,000 to nearly $900,000 at other places by the usual twin jetty system. It may therefore be safely stated, even without awaiting the completion of the breakwater and the removal of the obstructing jetty, that as our respected Vice-President, Mr. Coleman Sellers, remarked only last evening in referring to the progress of the Mechanic Arts: "Two blades of grass have been made to grow where one grew before." In fact the adage may be carried further, since in this case the half of a blade (jetty) has done what two complete blades (jetties) have never done before in the same time, without dredging, and the American Philosophical Society has evidently not made a mistake of judgment in awarding its highly prized Magellanic premium and medal for this "invention and discovery."

GENEALOGICAL TREES OF BUTTERFLIES.

BY A. RADCLIFFE GROTE, A.M.

(*Read October 6, 1899.*)

Previous to 1897 the butterflies were generally regarded as monophyletic, springing from a single stem, the family branches being variously arranged by different authors. In classification they were kept together as "Rhopalocera;" and the only exception to this course was the more recently attempted exclusion of the Skippers, the family Hesperiadæ, under an analogous title, equally derived from the Greek, and having reference to the structure of the horns or antennæ. It must be admitted that the reasons given for this were inconclusive, where they were not wholly absent.

From studies of the neuration I was able to announce (February,

1897) the diphyletism of the diurnals, separating for the first time the Papilionides as a distinct phyletic line from the rest of the butterflies, and keeping these latter together under the title of Hesperiades. It is the Hesperiades alone whose ancestry can be sought for in the Noctuid branch of Dyar's Bombycides (Agrotides), since to this presumptive lineage the Papilionides are apparently alien. For the general pattern of the veining of the Lycæni-Hesperiadæ is repeated in the Agaristid branch of the Bombycides, equally without any indication of affinity with the Papilionid type. With regard to classification and linear succession, it may be said that in the main points I follow Fabricius, in 1787, but it must be said that I give adequate reasons for so doing which were previously wanting.

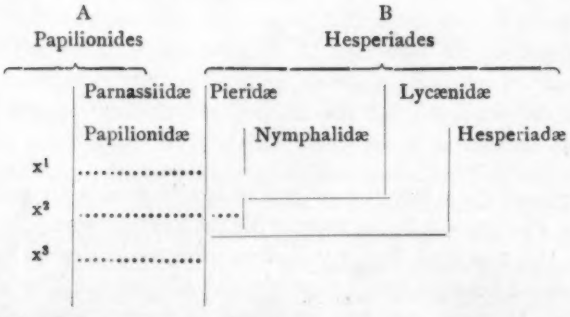
At the risk of appearing self-assertive, I endeavor to give clearly the original points brought forward by myself in various papers, and to the above statements there must be added, that I have tried to prove that the Blues and the Skippers are directly related, however distant the time may be assumed at which the divergence took place. The interpolation, therefore, between these two groups, of the group of the Swallowtails, by Scudder, Comstock and other observers, would be wholly inadmissible. I show that the points of similarity in structure between the Swallowtails and Skippers, brought forward by Mr. Scudder in 1877, are due to convergence, to that parallelism in development, announced by Milne-Edwards, of which Mr. Scudder appears to take no note, and for which he makes no allowance. Through studies of the Charaxinæ it becomes clear that the hesperid wing, with separated veins, underlies the wings of the group, while a normal evolutionary change in the specialization of the Radius develops in succession the wing of the Blues out of that of the Skippers.

The family Hesperiadæ are then a survival of an ancestral stage in the evolution of the other groups of the Hesperiades, *i. e.*, the Pieridæ, or Whites, the Nymphalids, or brush-footed butterflies, the Lycænids, or Blues. I show, from the fact that a diminution of the internal veins of the hind wings accompanies specialization in other groups of the Lepidoptera (*i. e.*, Saturniades, Tineides), that the Papilionides, or Swallowtails, cannot represent an ancestral phase of any of the other families of the diurnals, because in this respect they are the more advanced group. The assumed generalization of the Papilionides, which has led to the view that they are

lower than the other butterflies, would be a mistaken assumption. The opposite view, that the Hesperiades represent ancestral forms of the Papilionides, would be the more tenable, were it not contradicted by the fact that the Papilionides possess an exclusive character in the short, downwardly curved anal vein of the fore wings. The diphyletism of the two groups becomes thus apparent and prevents further comparison. The Papilionides and Hesperiades are parallel developments and neither represents an ancestral stage of the other.

In a review of the genealogical trees of the butterflies hitherto published, it will again make the subject clearer if we commence with the diphyletic tree, first published by me in 1897. I choose here the elementary first sketch, already printed in the PROCEEDINGS OF THE AMERICAN PHILOSOPHICAL SOCIETY for January, 1899, giving dotted lines to show the different points at which it has been presumed that the Papilionid line may have intersected with the Hesperid. In the trees published by me in the *Butterflies of Hildesheim* and in *Natural Science*, I endeavored to intercalate the minor divisions upon this basis. The three culminating family groups, the Parnassiidæ, Pieridæ and Lycænidæ, have, in certain forms, the Radius of the fore wings specialized by the reduction of the branches to four, and sometimes even three in number. In the three lower groups the Radius always remains in a generalized, five-branched condition. Most of the six family groups of butterflies retained have been elsewhere subdivided into families; but, for the sake of simplicity, the names are here used in their older collective sense.

FIG. 1. *Diphyletic genealogical tree of the Butterflies, Grote, 1897.*



EXPLANATION.

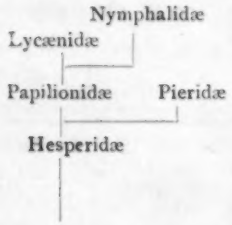
x^1. Dotted line of connection proposed in consequence of analogies of the Papilionides with the brush-footed butterflies. This line is apparently favored by Chapman, 1895, Packard and Quail.

x^2. Dotted line of interconnection indicating that the Papilionides represent an ancestral form of the other butterflies, excluding the Skippers. This line is favored by Scudder, Comstock and others, who place the Papilionides between the Lycænidæ and Hesperiadæ, just above the latter.

x^3. Dotted line of interconnection indicating that the Papilionides represent an ancestral form of *all* the diurnals and that these latter would be monophyletic. I reject *all* the dotted lines, considering the butterflies as diphyletic. The two separated stems, and the arrangement of the collective groups, represent the conclusions to which I have arrived.

I shall now briefly discuss the monophyletic trees published by authors and reproduce two of them. The monophyletic designs published by Scudder (1877) and Reuter (1896) do not differ in principle. In both the brush-footed butterflies are placed "at the head," and the view is expressed that the Papilionides are degraded forms. In addition, Reuter conceives that the Papilionides embrace also the Pieridæ, an old opinion based mainly on coincidence of color between the Parnassians and the Whites and a similarity in pupal suspension. I have endeavored in my writings to expose its fallacy. All methods of pupal suspension in the butterflies are paralleled in other Lepidoptera. The drawings published by Scudder and Reuter are too fanciful or complex to allow of reproduction here.

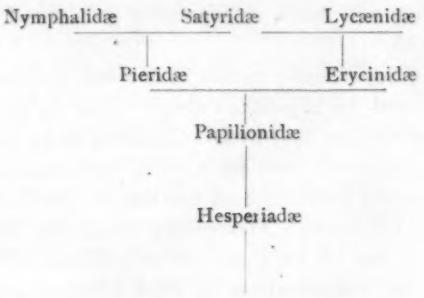
FIG. 2. *Monophyletic tree of the Butterflies, Packard, 1895.*



In this genealogical tree the collective family groups are reduced to five, the Parnassiidæ being fused with the Papilionidæ. A comparison of this tree with Fig. 1 will show that the entire butterflies are intercalated between the Lycænids and Skippers. The ancestors of the Skippers are first imagined to have thrown off the

Pieridæ, these the Swallowtails, these the Nymphalids and again the Blues. The dislocation of the Blues and Skippers is entire and the positions are so reversed that a criticism here would take up too much space. This criticism will, moreover, become apparent upon a comparison with what I have written in these pages and elsewhere. It will be better to pass on to the latest tree published of which I have any knowledge.

FIG. 3. *Monophyletic tree of the Butterflies, Hampson, 1898.*



It is to be presumed that Mr. Meyrick agrees with this classification. There is no entire tree of the butterflies in the *Handbook*, 1895, but the classification agrees with the above, while there are a number of diagrams of the generic branchlets. A study of these show that Mr. Meyrick has not read the meaning of the changes in position of the veins as made out by Comstock and myself. It is characteristic of the genealogies of Meyrick and Hampson, that no reasons for the position of the groups are given in the accompanying text. They cannot thus be subjected to a proper scrutiny, and are, to a great extent, enigmatical. In the above tree the Hesperiadæ, with two internal veins on the hind wings, are placed at the base of the series, in the position of ancestors of the Papilionides, which have only one. This, of itself, would not be incredible. But we are further asked to believe that the Papilionides, with one internal vein, have then given birth to a variety of divergent forms having again two internal veins on the hind wings. This is quite incredible. It may be said that analogous contradictions occur in such of Mr. Meyrick's genealogies as I have carefully examined. It is understood that Mr. Meyrick has paid great attention to the veining of the wings, but in his resultant systems the character is apparently not regarded as crucial.

The object of this communication is attained by this brief review of the genealogical trees of the butterflies in literature The anomalous position of the Papilionides, assigned to them by Bates, Scudder and the Scandinavian school of writers, has been the principal cause of confusion. In addition, the methods of general zoölogy have been neglected, and this neglect has led to a system of false reasoning, by which the misplacement of the Papilionides has been propped up. To all this has often been added a lack of any serious study of the neuration. The fact that no monophyletic tree of the butterflies will work satisfactorily and stand criticism may be thus explained.

The termination of Superfamily names in *ides* was proposed by F. J. Buckell and adopted by myself in 1895. The names Hesperi[a]des and Papilionides are used by Dr. Chapman as early as April, 1895, but the former name is used for a group containing only the Skippers, while under the latter title all the rest of the diurnals are included. Thus Dr. Chapman's Hesperides equal the Grypocera of continental writers, and his Papilionides their Rhopalocera. This is also the same as the classification by Prof. Comstock in 1893, who gives the English names of Skippers and Butterflies to the two groups, and ventures to say that "if we remove the Hesperidæ (Comstock's Skippers) from the division of the order, as indicated above, the Butterflies form a well-defined group." The classification, however, proposed in my writings is here opposed to both that of Dr. Chapman and of Prof. Comstock, as well as to that of all other authors known to me. The diphyletism of the diurnals is mooted by no other writer and the idea is original with myself.

The Papilionides appear to form a closed group. The Hesperiades appear to be an open group, open to the moths. The Nymphalids, or brush-footed butterflies, form several subparallel converging minor groups and seem properly regarded as an offshoot (monophyletic) from the main stem of the six-footed Hesperiades, which latter culminates in the Pieridæ. The parallelism between Leucophasia and Heliconius supports this view. The Whites show a specialization of the Radius, which the Nymphalids do not, while retaining a more generalized stage of suspension of the chrysalis. The fastening of the latter by the tail alone is copied exceptionally in other groups of the Lepidoptera. Here we again have an inequality of specialization in the secondary (generic) characters of the different stages, an observation made by me originally in 1876,

and the correctness of which receives constantly fresh proof as the results of closer studies are published.

When Comstock uses the word "butterfly," he means all the diurnals except the Skippers, the family *Hesperiadæ*. Thus he connects the Papilionides with the other diurnals, including the Blues, and merely regards them as thrown off at an early period. The Papilionides are thus placed at the base of his "butterfly" system, and the Lycænids and Hesperids are divorced, as in Mr. Scudder's arrangement. My course is the very opposite of this. I unite the Skippers with the Blues and connect both with the Nymphalids and Whites (the affinity of which two groups is pointed out by Chapman) under the name *Hesperiades*, and I show that this distinct stem of the Lepidoptera is open to the moths. I then separate the Papilionides as a closed group, having great analogy but no affinity with the rest of the diurnals. The Skippers (*Hesperiadæ*) are really what they appear to be on the surface, an intermediate type between the Lycænids and the moths, assisting in keeping the phylogenetic line open in that direction. But they represent an old and now specialized type, and their proper characters have been made of undue importance by anxious classificators, who have then called them by hard and peculiar names. I try to show that the Skippers are an offshoot of the same main stem which gives us the brush-footed butterflies and the Pierids, from which groups they are not excluded by any character of primary value.

The reversal of the generic arrangement *within* the group of Papilionides is based on neurational features, which prove to me that the Parnassians are more specialized and younger forms. A mere general survey of the group seems to show that this view is reasonable. It must be admitted that *Ornithoptera* is an unusual and original-looking type, compared with the bulk of the diurnals, and one still rich in species in the Australian area. It seems incredible that such a local type should be the offshoot of widely disseminated and more specialized forms of Papilio, to say nothing of the Parnassians. On the other hand, it appears not unreasonable to assume that Ornithoptera-like butterflies should have thrown off the forms of Papilio, many of which retain ornithopteran traits, and to believe that, through dispersal, the suffering of geographic and geologic (climatic) change, the Parnassian types should at length appear. So like the Pierids do the associating Parnassians become, that Mr. Reuter welds them with a nomenclatorial clamp, and Dr. Spuler

draws us a radiating figure, from which they equally project (*Zur Stammgeschichte der Papilioniden*, p. 492). Such progeny, so dissimilar in essentials, cannot have had a common womb. But when we examine the pale Parnassian from northern meadows, and the black and gold Ornithopteron from openings in the tropical forest, then the short anal vein on their fore wings reveals in both cases the blood of the Papilionides, the proof of common descent and of a separate origin from the Pierids and the rest of the butterflies. It is Dr. Spuler (*l. c.*) who derives *Ornithoptera* from Papiliolike forms, so that I am totally at variance with this author in my views as to the classification and phylogeny of the Papilionides. While Dr. Spuler regards *Ornithoptera* as an end form, terminating a Papilionid branchlet, I consider it to represent an initial type coming nearer to the primitive form of the diurnal Papilionides.

I have been thus explicit in order to give clearly the radical points of distinction between the classification of the diurnals by any other author and my own.

Stated Meeting, October 20, 1899.

Vice-President SELLERS in the Chair.

Present, 22 members.

Newly elected members, Mr. Stuart Wood, Dr. Arthur V. Meigs and Prof. Remington, were presented to the Chair and took their seats in the Society.

The decease of the following members was announced:

Prof. Edward Orton, of Columbus, O., October 17, 1899, and Prof. Don Mariano Barcena, of the City of Mexico.

Mr. Henry Carey Baird read an obituary notice of the late Col. Alexander Biddle.

Proceedings of Officers and Council were submitted.

Pending nominations for membership having been read, the Society proceeded to an election.

The Curators presented the completed bound volumes of the Curators' Record of Donations, with Index; also, the bound volume of the Curators' Catalogue of Portraits and Busts.

The Tellers reported the election of the following gentlemen as members of the Society:

Prof. William Morris Davis, of Cambridge, Mass.

Russell W. Davenport, of South Bethlehem, Pa.

Mr. Frank Miles Day, of Philadelphia.

The Society was then adjourned by the presiding officer.

Stated Meeting, November 3, 1899.

Vice-President SELLERS in the Chair.

Present, 13 members.

Prof. William A. Lamberton, Mr. Charles E. Dana, and Prof. Marion D. Learned, newly elected members, were presented to the Chair, and took their seats in the Society.

Letters were read from Mr. Frank Miles Day, Prof. William Morris Davis and Mr. John Cadwalader, accepting membership.

From the President, announcing the appointment of Prof. Albert H. Smyth to prepare an obituary notice of the late Dr. Daniel G. Brinton, and from Prof. Smyth, accepting the appointment.

On motion of Dr. Morris, it was ordered that a Committee be appointed to arrange for a meeting in memory of the late Dr. Daniel G. Brinton, and that invitations be authorized to be extended to the learned societies to which Dr. Brinton belonged to participate in the same. The Chair subsequently appointed as the Committee Dr. Morris, Prof. Smyth, Mr. Culin, Mr. Burk and Dr. W. H. Greene.

The list of donations to the Library was laid upon the table, and thanks were ordered therefor.

The decease of the following members was announced:

Prof. Heinrich Kiepert, of Berlin, on April 21, 1899.

Prof. George Rawlinson, Canon of Canterbury.

Prof. George F. Barker presented a report as the delegate of the Society to the Stokes Jubilee at Cambridge, Eng.

Dr. Cleemann moved that translations of papers that have been published already in another language are not eligible for the *Transactions* or *Proceedings*. Adopted.

The Society was then adjourned by the presiding officer.

Stated Meeting, November 17, 1899.

Vice-President SELLERS, in the Chair.

Present, 16 members.

Mr. L. B. Stillwell, a newly elected member, was presented to the Chair and took his seat in the Society.

A letter was read from Vice-President Sellers, naming as the Brinton Memorial Committee, Messrs. J. C. Morris, A. H. Smyth, S. Culin, J. Y. Burk and W. H. Greene.

The Librarian presented a list of the donations to the Library.

The deaths of Sir Augustus Wollaston Franks, K.C.B., and Dr. Walter J. Hoffman, members of the Society, were announced.

Dr. C. N. Peirce read an obituary notice of Dr. W. G. A. Bonwill.

A communication from J. Dyneley Prince, Ph.D., entitled, "Some Passamaquoddy Witchcraft Tales," was presented.

Also a communication by John Van Denburgh, of Baltimore, Md., entitled "Notes on Some Birds of Santa Clara County, California."

The Society was then adjourned by the presiding officer.

NOTES ON SOME BIRDS OF SANTA CLARA COUNTY, CALIFORNIA.

BY JOHN VAN DENBURGH.

(*Read November 17, 1899.*)

This paper has been prepared in response to several requests for such notes as I might have on the land birds of Santa Clara county. It is based upon more or less casual observations extending over a period of fourteen years, and makes no pretense to completeness in any way.

Santa Clara county is slightly greater in extent than Rhode Island. Roughly, it may be described as a great valley lying between two mountain ranges. The eastern range rises, in Mount Hamilton, to a height of nearly 4450 feet. The western range is considerably lower. The floor of the valley is made up of the southern marshes of San Francisco bay, parklike expanses of open oak groves, orchards, vineyards and great grain fields. The western mountains, where not already under cultivation, are clothed in chaparral throughout their lower levels, while a fringe of redwoods stands in outline against the sky.

It is at two points in this western range—Los Gatos and Palo Alto—that nearly all my observations have been made. Doubtless many additional species occur in the valley and in the eastern mountains, and it is my hope that other observers will soon complete the list.

Lophortyx californicus. California Quail.

Quail are resident in all parts of the county. During March and early April their calls may be heard almost incessantly, for this is the season of courtship, and even the most bashful of the *debutantes* does not hesitate to reply to the amorous notes of her lovers. At such times the males seem almost devoid of fear, and, if a female be caged, will strut boldly up to her prison door, even though an observer be openly stationed a few feet away. Rival suitors often engage in fierce conflicts, for what is to the female the tenderest of love calls is to another male the sharpest of challenges.

A few coveys often remain as such through the year, but the middle of April finds most of the quail roaming in pairs. Even at this

date some of the more enterprising have selected their homes, and, in a few instances, begun to lay (April 19, 1888). The majority, however, wait until nearly a month later.

After the nest has been finished and laying begun, one egg is deposited each morning, with an occasional intermission, until the set is complete. The number of eggs laid varies greatly. I have found incubated sets of from ten to nineteen eggs, and reports of nests containing twenty-five have reached me from reliable farmers. Two pairs kept in captivity during the summer of 1888 laid sixty-six eggs (twenty-five and forty-one).

Single eggs are often found on the ground in places where least expected. This, I believe, is due to indecision on the part of the female, for caged birds deposited several eggs at random before choosing a definite nest. It is not unlikely that nests sometimes receive eggs from more than one female. This certainly is true of caged quail. I have found two nests of *Pipilo maculatus oregonus* which contained, besides the usual four eggs of the towhee, one and three quail's eggs respectively.

Sometimes both birds are flushed from the nest, but the duties of incubation usually fall to the lot of the female. A hint of the tragedies that sometimes occur at this time is given in the following items from my notebook:

On May 18, 1898, while clearing away some vines, a quail's nest was discovered in the corner of a chicken-yard. When first shown me this nest contained six eggs and was partially hidden by some dead vines which had been placed over it. May 26: Female sitting on nine eggs. May 27: Female incubating. May 28: The eggs were cold and quail feathers were scattered all about. Evidently the female had been caught and eaten during the night. May 29: The male has taken the female's place on the nest. I fear he will share her fate. May 30: The male's feathers are mingled with those of his mate.

Often, while the female is incubating or has gone on the nest to lay, her mate mounts upon some post or tree nearby and gives vent to his feelings in a metallic call that may be represented by the monosyllable "kayrk." This note, which is repeated drawlingly at frequent intervals, is heard only at this season.

The period of incubation is, to judge from caged birds, twenty-one days. The young often leave the nest before their down has dried, and are from the first gifted with great ability to hide. It is

probable that two broods sometimes are reared in a season, for I have found nests containing fresh eggs as late as June 26 (1889).

The very young birds feed, to a great extent, on the seeds of a small grass, which ripen in May and June. Later in the summer various seeds and grains are eaten, and during the autumn and early winter grapes, and then the berries of the California holly form a large part of their diet. In the early spring, after the seeds have sprouted, the quail live almost entirely on the tender leaves of the young weeds which cover the ground. They are very fond of the inner portions of various small bulbs turned up by the plow. A pair made daily visits to a cherry tree during the season of that fruit.

Many of the oaks near Los Gatos contain nests made of twigs by a species of wood-rat. The quail often resort to these when hunted and it is very difficult to get one to leave when once it is thus hidden. On the 16th of May, 1886, I flushed a pair of quail from such a nest, built about eight feet from the ground, and upon climbing to it found it to contain five eggs. Two days later this nest was empty.

Columba fasciata. Band-tailed Pigeon.

This pigeon is a rather common migrant and winter resident, occurring from October 6 (1889) to May 9 (1890). It feeds on the red fruit of the Christmas berry, acorns, oak buds and grain, but rarely descends to the ground. The largest flock, containing between seven hundred and a thousand birds, was observed near Los Gatos in November, 1887. Usually the flocks are composed of from two to three dozen individuals. At Palo Alto they may be found throughout the winter and well on into May.

Zenaidura macroura. Mourning Dove.

A common spring and summer resident, arriving about the end of March. I have found fresh eggs from the first week in May until the last in June. The doves eat large quantities of the shiny black seeds of a sort of "cockscomb" which grows very abundantly in parts of the valley.

Pseudogryphus californianus. California Vulture.

Two vultures seen near Los Gatos are my only records of this species in Santa Clara county.

Cathartes aura. Turkey Buzzard.

Buzzards may be seen at any season of the year, sometimes in

large companies. They formerly nested near Los Gatos, and still do so among the redwoods near Boulder creek, Santa Cruz county.

Elanus leucurus. White-tailed Kite.

I have never seen this beautiful hawk near Los Gatos. In the vicinity of San José and Palo Alto, however, it is a common resident, and its nests are not infrequently found. It hunts in pairs throughout the year.

Accipiter velox. Sharp-shinned Hawk.

Sharp-shinned hawks are very abundant in winter, both at Los Gatos and Palo Alto, where they wage ceaseless war on the Juncos and Zonotrichias. One was shot while trying to get at some quail in a trap. I have never observed them in summer.

Accipiter cooperi. Cooper's Hawk.

I have seen but two specimens of this hawk, both at Los Gatos in autumn.

Buteo borealis calurus. Western Red-tail.

This fine hawk is a very common resident in all parts of the county. Measurements of a young bird, which was taken from a nest near Palo Alto, April 30, 1893, and fed upon raw beef, show great rapidity of growth:

May 1,	length	5.86	inches,	extent	7.00	inches,	weight	145	grammes.	
" 2,	"	5.90	"	"	7.05	"	"	170	"	
" 4,	"	6.50	"	"	7.50	"	"	190	"	
" 6,	"	6.75	"	"	8.00	"	"	219	"	
" 8,	"	7.25	"	"	8.50	"	"	250	"	

This bird was covered with soft down, pure white, except on the top of the head, the scapular and interscapular areas, the dorsal surfaces of the wings, and two bands running forward from each eye to the cere, where the down was slightly tinged with slaty gray. Pinfeathers were just beginning to appear along the sides of the body.

Buteo swainsoni. Swainson's Hawk.

I have never seen this species at Los Gatos. It is not common at Palo Alto, but specimens are occasionally killed.

Aquila chrysætos. Golden Eagle.

In the eastern parts of the valley and in the mountains near Mount Hamilton, this eagle breeds abundantly, but it seems to avoid the western portions of the county, where I have seen it but once, at Los Gatos, in winter.

Falco sparvarius deserticola. Desert Sparrow Hawk.

This is the commonest of our hawks. It is resident in all parts of the valley, and breeds abundantly in the cavities of the white oaks in April and May.

Strix pratincola. Barn Owl.

Barn Owls are very common at Palo Alto and near San José, but are rarely seen at Los Gatos. A nest in a hollow oak near Palo Alto, visited May 13, 1894, contained one egg, three young owls and five gophers. The gophers were arranged in a row at one side of the cavity, their headless necks all directed away from its centre, where the egg and young owls lay.

Asio wilsonianus. Long-eared Owl.

I have seen this owl but once, on Black Mountain, February 18, 1893.

Asio accipitrinus. Short-eared Owl.

A single specimen was killed near Los Gatos in the fall of 1891.

Megascops asio bendirei. California Screech Owl.

This is a resident species, which breeds abundantly in all parts of the county, usually in May.

Bubo virginianus pacificus. Pacific Horned Owl.

This large owl may often be seen toward five or six o'clock in the afternoon of warm, clear days in April and May soaring in pairs or skimming over the fields in search of food. Near Palo Alto the species is quite common and nests in the large oaks which abound in that district. The nest examined May 14, 1892, contained two half-grown young. The following year this pair constructed a nest in a white oak about two hundred yards from that which contained their nest of 1892. This new nest was made of coarse twigs and was partially lined with moss. Its construction occupied the owls about two weeks. When deprived of the two eggs which they laid in this nest the birds returned to the nest of 1892 and laid two

there. The extreme rarity of this owl at Los Gatos is doubtless due to the absence of large trees.

Speotyto cunicularia hypogæa. Burrowing Owl.

This a common resident in many parts of the county. A pair have nested near the same spot on the campus of Leland Stanford Junior University three successive years. In winter one bird may always be seen near this nest burrow (of *Spermophilus*), but I have never seen two there at that season. In this burrow I have found at various times remnants of gophers, meadowlarks and toads.

Glaucidium gnoma californicum. California Pygmy Owl.

Twice, in May, 1898, a Pygmy Owl came at about six in the morning and dashed itself against the wire netting of my bird cage.

Geococcyx californianus. Road-runner.

Road-runners are not very common. I have seen them either at Los Gatos or Palo Alto in every month of the year except January, and have taken their eggs in May. A nest found in a white oak near Los Gatos, May 31, 1888, held four eggs, two of which contained large embryos. This nest was made of oak twigs, lined with weeds and grasses, fifteen feet from the ground. Diameter, twelve inches; height, eight inches; cavity diameter, seven inches; cavity depth, three inches. Another nest, in a cypress near Palo Alto, contained four highly incubated eggs, May 14, 1892.

Ceryle alcyon. Belted Kingfisher.

Kingfishers are sometimes found along the larger streams of the county, where they occasionally breed.

Dryobates pubescens gairdnerii. Gairdner's Woodpecker.

This active little bird is nowhere very common, although seemingly more abundant at Palo Alto than at Los Gatos. A nest in a maple near Los Gatos contained five fresh eggs, May 5, 1890.

Dryobates nuttallii. Nuttall's Woodpecker.

I have seen this bird only on Mount Hamilton, where it is said to breed.

Sphyrapicus varius nuchalis. Red-naped Sapsucker.

A bird which I shot at Palo Alto, February 17, 1893, is, while not typical of this form, much nearer *S. varius nuchalis* than *S. ruber*. It was busy in a small grove of pepper trees when found.

Sphyrapicus ruber. Red-breasted Sapsucker.

My first bird of this species was seen and shot at Los Gatos, November 6, 1892. It was an adult male in high plumage. I saw another at Palo Alto on December 8 of the same year. Two were killed by others during that winter. I have seen none since.

Melanerpes formicivorus bairai. California Woodpecker.

At Palo Alto this bird is the commonest of its tribe, and numbers of its storage trees may be seen. One large oak at Stanford University contained fully five thousand acorns. All that I examined had been placed, apex inward, in holes which had been drilled just through the bark to the hard wood. Usually but one acorn was placed in a hole, but in some instances several were wedged in together. The holes made by the birds are often very close together. This particular tree has been studded from within about six inches of the ground to about thirty-five feet above it. It has been suggested, perhaps not seriously, that the birds store the acorns in order to procure the larvæ which develop in them. October 2, 1892, I gathered twelve acorns from the lower part of the trunk. Three contained grubs, while the others were sound. November 13, I examined one hundred and fifty acorns. Of fifty taken between the ground and five feet above it, twenty-three were sound, twenty-three contained one grub each, one contained two grubs and three each sheltered three grubs. Of the second fifty, taken between five and ten feet from the ground, forty were sound and ten held grubs. Of the third fifty, taken between ten and fifteen feet from the ground, twenty-two contained grubs. Sixty more were examined on December 11; only twenty-five were sound. Mr. J. M. Stowell examined numbers of the stomachs of these birds at Stanford University and informed me that they contained nothing but bits of acorn.

The birds are very gregarious and noisy. They may be seen in flocks of from six to a dozen or more even during the breeding season.

Melanerpes torquatus. Lewis' Woodpecker.

I have never seen this woodpecker at Los Gatos. It is rare in the oak groves lower in the valley, and is not often seen at Palo Alto.

Colaptes cafer. Red-shafted Flicker.

Flickers are common at all seasons of the year, but are much more abundant in winter than in summer, there seeming to be a considerable immigration of northern birds at this season without a corresponding exodus. With these northern (?) individuals of *C. cafer* come numerous birds showing more or less *auratus* blood. Some of these are almost true *cafer*, others almost typical *auratus*. One, now in the collection of Leland Stanford Junior University, has the rectrices of one side yellow and shorter than those of the other side, which are red.

These birds nest late in May, and lay usually five, sometimes four or six eggs.

Colaptes auratus luteus. Northern Flicker.

I add this name only on the strength of some of the birds mentioned above. All show traces of *cafer* blood.

Phalænoptilus nuttalli californicus. California Poorwill.

This curious bird may often be seen toward dusk squatted in the dust of the old and less frequented roads of the hill region. Here they may often be followed for a quarter of a mile or more, rising when approached, but alighting again farther on. In August they feed on a gray moth, and when disturbed utter a few quick, short notes very different from their plaintive love call.

Chætura vauxii. Vaux's Swift.

No rule can be given for the coming and going of these birds, whose movements seem to be regulated, if regulated at all, by the abundance of insect food. I have seen them very many times, but find only two dates in my notebooks—Palo Alto, April 27, 1893, and Los Gatos, August 24, 1893. They are usually seen in company with *Tachycineta thalassina*, and I have reason to believe that both breed among the redwoods of Santa Cruz county.

Calypte anna. Anna's Hummingbird.

Anna's hummingbirds are resident throughout the year, though they probably are fewer in winter than at other seasons. One unusually cold winter day I found a male of this species perched on a rafter in a barn and unable to move until warmed in the house, when he flew about seemingly none the worse for his torpor. They sometimes begin to nest in January, and I have found nests con-

taining young birds as late as July 4 (1890). It is probable, therefore, that they raise more than one brood each year. The nests are beautiful structures, often so covered with lichens as to be very well disguised. This is especially apt to be the case when the nests are built in deciduous oaks. Other trees commonly used by these birds for nesting purposes are the live oak, Monterey cypress, pines, bay and eucalyptus. Late in the season they seem to prefer trees growing near or even overhanging running water. I have never seen the males take any part in nest building or in rearing the young. Indeed, they are almost never to be seen near the nests, seeming to prefer to spend their time perched upon an exposed twig in some lonely situation, or in making war upon their fellows. When attacking other birds they usually rise to a considerable height and then drop straight down as if to strike the enemy. When a few inches above the victim, however, they suddenly turn and rise again to the original position, giving vent, at the moment of turning, to a sharp rasping squeak, which has much the same effect on the enemy as the sudden click of a gunlock. In this way they vanquish even the jays.

I once saw two males of this species performing a curious sort of dance. They perched upon dead twigs, perhaps thirty feet apart and about half this distance from the ground, as if about to attack each other. Instead of doing so, however, they continually exchanged places, passing one another without any show of hostility, and meanwhile uttering their peculiar rasping song. This performance was continued during about fifteen minutes.

While feeding from flowers they frequently steady themselves in the air by holding with one or both feet to some twig or leaf. In feeding from certain plants, as the hibiscus, where the tube of the flower is too long to allow of their reaching its base in the ordinary way, these humming birds habitually plunge their bills through the under surface of the corolla near its base. They eat multitudes of small flies, either catching them in the air or, at times, picking them off the bark of trees where they have been attracted by exuding sap.

They are very fond of bathing, and for this purpose usually select a stream so small and shallow that they can stand in the water. Standing thus they dip first one side of the face and then the other in the stream in an indescribably graceful and dainty manner. Having thoroughly soaked themselves they dart to some

leafless twig to dry and carefully arrange their feathers. I have never observed them bathing in the spray of fountains.

Selasphorus rufus. Rufous Hummingbird.

This hummingbird seems to be most abundant in February and March when the wild currants are covered with their pink blossoms. It can then almost always be found where these bushes grow. The shriller whir of its wings enables one to distinguish it readily from Anna's hummingbird which is found in the same situations. It is even more pugnacious than the latter species and its nesting season probably is shorter. I have found its nests only in March and April. It usually builds in cypresses, pines, or eucalypti, and its nests are often very beautiful structures, especially when the highly colored stamens of the eucalyptus blossoms are used in their construction.

Tyrannus verticalis. Western Kingbird.

This beautiful flycatcher is abundant in many localities in the valley, but I never have observed it in the foothills west of Los Gatos.

Myiarchus cinerascens. Ash-throated Flycatcher.

I believe that these birds usually arrive at Los Gatos in April, although I observed one February 26, 1889. They begin to nest late in May (May 16, 1890; May 21, 1889; May 24, 1888), and eggs may sometimes be found after the middle of June (June 18, 1889). The number of eggs laid is ordinarily either four or five. The nests are usually built in cavities in oak trees, but a bird-box which I placed in a tree in a barnyard has been used by these flycatchers for the last ten years (1890–1899).

On May 21, 1889, I found a pair of these birds building in a common tin watering-pot hanging in a vine-covered arbor. The nest had just been begun. The first egg was laid May 25, and others were added on each of the next four days. This nest was made chiefly of hair from cows and rabbits, and was so soft that none of the five eggs could be seen in it even when one looked directly down.

Sayornis saya. Say's Phœbe.

Say's Phœbe appears usually in October or November and is not uncommon through the winter.

Sayornis nigricans. Black Phœbe.

This phœbe is common in all parts of the county and, even in the foothills where snow sometimes lies on the ground a few days in winter, is resident throughout the year. It begins to nest early in April, but fresh eggs may sometimes be found in June.

Contopus richardsonii. Western Wood Pewee.

The Western wood pewee is a common summer resident, arriving usually in April and leaving in September, or even late in August. It begins to nest early in June (June 4, 1892).

Empidonax difficilis. Western Flycatcher.

This flycatcher is a very common summer resident and breeds abundantly from May to July (May 4, 1891, to July 4, 1890). Its nests are built in all sorts of situations. One was made of grasses and green moss in some ferns which hung over the bank of a road. Others are made almost entirely of spider-web and placed on beams in low sheds such as cow-stables and hen-houses. The eggs are usually either three or four. The love-call of the male is fée-iss fée-iss, repeated over and over again.

Otocoris alpestris chrysolæma. Mexican Horned Lark.

I have never seen the horned lark at Los Gatos, though it is not rare only a few miles away in the valley.

Pica nuttalli. Yellow-billed Magpie.

This magpie breeds abundantly in the eastern and southern portions of the county, but I have never seen it in the western foothills.

Cyanocitta stelleri frontalis. Blue-fronted Jay.

At Los Gatos these jays are numerous throughout most of the year, but during the breeding season are almost never seen. Probably a few remain to breed in the deeper cañons, while the majority retire to the redwoods of Santa Cruz county. They are able mimics, and imitate perfectly the calls of the red-tailed hawk, quail and several other birds. One, which I kept in a cage with a number of small birds, killed and ate a golden-crowned sparrow.

Aphelocoma californica. California Jay.

These jays are very common and are very destructive to fruit. Their eggs may be found from the middle of March to the middle

of May (March 17, 1892, to May 16, 1889). Like the blue-fronted species this jay eats a great many bay-nuts, acorns and almonds. These it carries to some suitable situation, such as a fence rail or the limb of a tree, and, holding them with one foot, deftly cracks them with its bill. I have known it to eat the eggs of Anna's hummingbird, the house finch, the green-backed goldfinch and the brown towhee.

Corvus americanus. American Crow.

I have never seen the crow in this county, but Mr. J. M. Hyde tells me that he has found it near Gilroy, where it probably breeds.

Xanthocephalus xanthocephalus. Yellow-headed Blackbird.

This handsome bird breeds in considerable numbers in the marshes south of San José.

Sternella magna neglecta. Western Meadow Lark.

This was formerly a very common resident in all parts of the valley, but of late years the converting of grain fields into orchards has resulted in a great restriction of its territory. As a songster it is with us probably without an equal, unless the black-headed grosbeak or the California thrasher share its honors. The number of its eggs ranges from four to six. I have found fresh eggs from April 3 (1889) to May 31 (1890). Once in the breeding season, I shot one of these larks which had several wasps in its bill.

Icterus bullocki. Bullock's Oriole.

Bullock's oriole is a common summer resident which breeds abundantly in the valley, but rarely if ever in the foothills west of Los Gatos. It arrives about the middle of April (April 18, 1889; April 16, 1892; April 8, 1893) and begins to nest a week or two later (April 20, 1893). It is seen occasionally after the middle of August (August 17, 1892).

Scolecophagus cyanocephalus. Brewer's Blackbird.

In many parts of the valley these noisy birds breed abundantly in April and May. Most of the nests that I have seen were in live-oak or cypress trees, usually close to water. The usual number of eggs is five, though sometimes only four are found. I believe that only one brood is reared each year. Small flocks remain through the winter.

Carpodacus purpureus californicus. California Purple Finch.

This purple finch is at no time common. Individuals or little companies, however, occur all through the year. I regard them as stragglers from the redwoods near the coast, though some may, perhaps, breed in localities where conifers have been planted.

Carpodacus mexicanus frontalis. House Finch.

The linnet or redhead is probably our most abundant bird in spring and summer, but in winter is outnumbered by certain migratory species, such as the robin and the Zonotrichias. It does great damage to fruit, being especially fond of cherries, peaches and figs. It begins to lay about the middle of April, though eggs may sometimes be found a little earlier (April 9, 1888), and lays one egg each day until the set is complete. The number of eggs varies from three to six, but usually is four or five. I have known three broods to be raised in one nest in one year. Nests of the previous year not infrequently are relined and used, as are also those of other species, such as the brown towhee. The labor of nest building falls entirely on the female, but the male accompanies her on all her trips for material and sings almost constantly with great power and fervor. He, however, takes no part in incubation, and little or none in feeding the young, at least while they remain in the nest.

The following notes show, among other things, the period of incubation :

April 14, 1887. Found a nearly completed nest of the house finch.

April 15, 16. Female continued work on nest.

April 17. One egg.

April 18. Two eggs.

April 19. Three eggs.

April 20. Four eggs.

April 21. Five eggs.

May 3. Four young birds and one egg.

May 4. Five young.

July 14, 1899. House finches began a nest in a vine.

July 15. Nest building was continued.

July 16. Female carrying lining materials. Male always accompanies her, but carries nothing.

July 17. One egg. Female sitting at night.

July 18. Two eggs. Female sitting off and on, it being a very warm day.

July 19. Three eggs. Female sitting intermittently.

July 20. Four eggs.

July 21, 22, 23. Four eggs. Three young birds, probably of an earlier brood, roost at night in the vine with the male.

August 1. Noon: Four eggs. Evening: One egg has hatched.

August 2, 8 A.M. Two eggs and two young. Noon: Same. 6 P.M.: One egg and three young.

August 3. Four young.

August 18. Noon: One young bird on edge of nest, three in nest. Later: Four young in nest. 5 P.M.: One young bird in vine a foot from nest. 6 P.M.: Two young in vine, then back in nest. 7 P.M.: Three of the young have flown to neighboring trees; one is still in vine. Later: All are gone.

On May 4, 1893, I found a nest containing four eggs and a female that evidently had died while sitting. All were cold.

In the spring of 1898 I transferred three young linnets from the nest where they had just hatched to the nest of a pair of domestic canaries whose young were of about the same size. The canaries showed no objection to this sudden addition to their family, and reared all successfully. Late in the summer two of the young linnets began to sing in low tones. To my surprise, their song was entirely copied from that of their foster parent, though of only about half its extent. Early in the summer of 1899, these birds were liberated. Their song then consisted of about one-half of the song of the house finch, followed by several trills from the song of the canary and for several months after this they could be distinguished by it. What finally became of them, I do not know. Birds which have been reared in a cage have the usual red of the plumage replaced with yellow. Caged adults also become yellow after moulting.

Astragalinus tristis salicamans. Willow Goldfinch.

I have not seen this bird at Los Gatos in summer, although it occurs there in considerable numbers in winter. It is not rare at Palo Alto at any season.

Astragalinus psaltria. Green-backed Goldfinch.

This beautiful goldfinch breeds very abundantly in all parts of

the valley which I have visited. That it is also very abundant in winter and early spring may be seen from the following item from my notebook:

"March 21, 1888. Counted seventy-two goldfinches in a large white oak. Probably there were a hundred and fifty in all, mostly *S psaltria*, and the males were in full song, forming a charming chorus for all their lack of leadership."

Nest building begins early in April (March 30, 1889), and fresh eggs may be found as late as the 1st of August (July 31, 1888). The number of eggs laid varies from three to five, but usually is four. Rarely, sets of pure white eggs are found. I found one set of four eggs, of the usual bluish tint, of which one was finely dotted with reddish brown. The nests are built in all sorts of trees and bushes (blackberry, raspberry, grape, maple, orange, apple, peach, oak, fig, bay, greasewood, bamboo, etc.), at heights varying from two to thirty feet.

Astragalinus lawrencei. Lawrence's Goldfinch.

This species is not nearly so common as the green-backed goldfinch, but is by no means rare. It nests in May and June and usually lays five eggs.

Spinus pinus. Pine Siskin.

The siskin usually is a very common bird in winter, though sometimes few are seen. I have not observed it in summer, but Mr. James M. Hyde tells me that a pair nested in Santa Clara several years ago.

Ammodramus sandwichensis bryanti. Bryant's Marsh Sparrow.

I never have noted this bird at Los Gatos, though it is common at Palo Alto, especially in winter.

Chondestes grammacus strigatus. Western Lark Sparrow.

The lark sparrow breeds commonly, throughout the county, in April, May and June. I saw one carrying nesting materials March 22, 1889. The nests are built either on the ground or in trees or bushes. The species does not occur at Los Gatos in winter (arriving in March), but probably is to some extent resident in the lower parts of the valley.

Zonotrichia leucophrys intermedia. Intermediate Sparrow.

This form occurs in some numbers in winter, but is never so

abundant as Gambel's sparrow. I believe that a few individuals of the true *leucophrys* occur, but of this I am not positive.

Zonotrichia leucophrys gambeli. Gambel's Sparrow.

Gambel's sparrow usually appears at Los Gatos in September (September 22, 1891) and remains until the end of March (April 1, 1890). It is more abundant at Palo Alto and San José than at Los Gatos.

Zonotrichia coronata. Golden-crowned Sparrow.

Probably the most abundant winter bird at Los Gatos is this handsome sparrow. It usually arrives in September (October 1, 1887; September 22, 1888; September 16, 1889; September 23, 1891; August 31, 1892), and leaves in April (April 3, 1889; April 11, 1892; April 20, 1893). It is common at Palo Alto, but probably less so than the white-crowned varieties.

Spizella socialis arizonæ. Western Chipping Sparrow.

The chipping sparrow is a fairly common resident, breeding usually in May. I saw none in 1892.

Junco hyemalis oregonus. Oregon Junco.

Junco hyemalis thurberi. Thurber's Junco.

Junco hyemalis pinosus. Point Pinos Junco.

A few juncos nest in the chaparral belt near Alma. They appear indistinguishable from the juncos which breed throughout the redwood region of Santa Cruz county, and which I have no hesitation in calling *J. h. pinosus*. This same pale-headed, pink-sided variety occurs during the winter. At this season one finds also dark-headed, pink-sided birds, which I call *J. h. oregonus*, and dark-headed birds, with comparatively little pink, which I refer to *J. h. thurberi*. The juncos usually arrive at Los Gatos in October (October 21, 1887; September 16, 1889), and a few remain until late in April. The October and April birds seem to be mostly *J. h. pinosus*.

Amphispiza belli. Bell's Sparrow.

This bird appears to be of very local distribution in Santa Clara county. I have found it only on a small tract near the summit of the mountains west of Los Gatos. Here a considerable colony

breeds every year, but their nests are so well hidden that I have found only one. This was built in a small bush and held three slightly incubated eggs, May 9, 1898. The old birds were feeding their young a kind of yellow spider, June 23, 1892.

Melospiza fasciata samuelis. Samuel's Song Sparrow.

Samuel's song sparrow is a very common resident. It nests in bushes, usually within a foot or two of the ground, though sometimes at a height of more than ten feet. Its three or four eggs may be found from the first week in April (April 4, 1889) to the last of June (June 29, 1889). Very frequently one of the eggs fails to hatch. Discarded snake skins are sometimes used in constructing their nests. This song sparrow daringly enters all sorts of holes and dark corners about woodpiles and under boxes, where no other bird except a wren would think of going.

Melospiza lincolni. Lincoln's Sparrow.

My experience would lead me to believe that Lincoln's sparrow is a rather rare winter visitant, though it may, perhaps, prove to be fairly common in the low-lying portions of the valley. One was shot February 21, 1891.

Passerella iliaca unalaschcensis. Townsend's Sparrow.

This is a common winter resident in the foothills. It usually arrives in October and stays late in March.

Pipilo maculatus oregonus. Oregon Towhee.

To this name I refer the common "black-headed" towhee resident in the foothills west of Los Gatos. It is not typical *oregonus*, but approaches that form far more closely than it does *P. m. megalonyx*. Probably in winter some nearly typical *P. m. oregonus* can be found. What the bird of the eastern side of the valley is I do not know, but I shall not be surprised if it prove much closer *P. m. megalonyx*.

This bird almost invariably builds on the ground, though in a few instances I have found its nest in bushes. Its eggs are usually four, sometimes three, in number, and may be found from late in April (April 24, 1889) until the middle of July (July 11, 1888). April 30, 1888, I found a nest of this bird containing four eggs of the towhee and one of the California quail. Wishing to learn whether the towhee objected to bringing up other people's children, I took

her four eggs, leaving only the quail's egg in the nest. The next day the towhee was still sitting, though it cannot be supposed that she was unable to detect the great difference in size, color and shape between this egg and her own. The next year (May 17, 1889) I found a nest of this species containing the usual four towhee's eggs and two quail's eggs, in addition to which there was a third quail's egg on the ground about six inches from the nest. The towhee was sitting.

Pipilo fuscus crissalis. California Towhee.

This is a very common resident. The birds apparently remain paired through the year. Nesting begins about the middle of April (April 16, 1889), and young birds may sometimes be found still in the nest in September (September 3, 1899). The number of eggs usually is three or four, and one is laid each day until the set is complete. The period of incubation is fourteen days.

Oreospiza chlorura. Green-tailed Towhee.

One was shot in a river bottom near San José during the winter of 1889 or 1890.

Zamelodia melanocephala. Black-headed Grosbeak.

This grosbeak must be ranked among the very finest of our songsters. The song begins with a series of loud, clear notes, delivered, at considerable intervals, in a more or less declamatory style. These are followed at length by runs and trills fully as tender and liquid as the notes of a thrush, and quite as well executed as those of a well-trained canary. This song is repeated over and over again, almost without a pause. One that I timed sang nearly twelve minutes, with never a pause of more than ten seconds. This grosbeak arrives about the middle of April (April 16, 1890; April 15, 1892), and comparatively few remain until September. Nest building usually begins early in May, but the last of the young sometimes remain in the nest until the middle of July (July 12, 1888). The males assist in the duties of incubation.

Cyanospiza amœna. Lazuli Bunting.

This species arrives about the middle of April—the males always, I believe, coming a day or two before the females—and begins to build about the end of that month. I have found fresh eggs from May 1 to June 23 (1888). Occasionally the eggs are dotted with

brown. The number laid is ordinarily either three or four. A caged male often sang until nine or ten o'clock at night during the breeding season, though in the dark.

Piranga ludoviciana. Louisiana Tanager.

This beautiful bird occurs only as a migrant—during April and May and again in August and September. At these times it is fairly common. Last seen in spring, May 29 and 30, 1898.

Progne subis hesperia. Western Martin.

The martin breeds in some numbers on the Mount Hamilton range. I have not noted it on the west side of the county.

Petrochelidon lunifrons. Cliff Swallow.

This is a very common summer resident, appearing at Palo Alto about the middle of March (March 14, 1892), though it usually does not reach Los Gatos much before April. It breeds in June.

Hirundo erythrogaster. Barn Swallow.

For some years a colony nested at Alma.

Tachycineta bicolor. Tree Swallow.

Along the western side of the county this swallow breeds quite abundantly in holes in white oaks.

Tachycineta thalassina. Violet-green Swallow.

This gorgeous bird is an irregular summer visitant, probably from the redwood region nearer the coast. I have no knowledge of its breeding in Santa Clara county.

Stelgidopteryx serripennis. Rough-winged Swallow.

A number of these birds breed near San José.

Ampelis cedrorum. Cedar Waxwing.

This waxwing is an occasional winter visitant. I have seen none for several years.

Lanius ludovicianus gambeli. California Shrike.

This is a common resident of the valley. I have not found it breeding in the foothills west of Los Gatos, though it is frequently seen there after the nesting season is over. On September 3, 1892, I observed one perched in the top of a cherry tree, singing very sweetly and with much power.

Vireo gilvus. Warbling Vireo.

It is usually early in April that this vireo arrives at Los Gatos. By the middle of that month it becomes common, and a little later nest building begins (April 18, 1890; April 27, 1889). Its eggs are usually four, sometimes only three, and may be found throughout May and the greater part of June (April 26, 1890; June 20, 1889).

Vireo huttoni. Hutton's Vireo.

This is a fairly common winter resident near Los Gatos. I believe it retires to the coast to breed.

Helminthophila celata lutescens. Lutescent Warbler.

It usually is not until about the 1st of April that this warbler becomes common, although individuals arrive a week or two earlier. In this vicinity their nests seem always to be built upon the ground, and those of several years often are not more than a few inches apart. Nestlings may be found from the last week in April until the end of June (April 25–June 30, 1889). Four or five eggs are laid.

Dendroica æstiva. Yellow Warbler.

This is a common summer resident and breeds abundantly, especially on the floor of the valley, in June.

Dendroica audubonii. Audubon's Warbler.

This warbler occurs in large numbers, from October on through the winter. It is most frequently seen in companies, often with the western bluebird and the various goldfinches, and feeds, to some extent, on grapes.

Dendroica townsendi. Townsend's Warbler.

A few specimens of this warbler have been taken at Santa Clara by Mr. J. M. Hyde. I regard them as stragglers from the redwood region near the coast, where this bird is common during migrations.

Geothlypis tolmiei. Tolmie's Warbler.

I have only one record of this warbler. On May 17, 1890, I came upon a fine male in the foothills west of Los Gatos. Seven days later, in the same place, I saw both male and female carrying food. Doubtless they had a nest, but careful search failed to reveal it.

Geothlypis trichas occidentalis. Western Yellow-throat.

A number of these birds breed in the marshes south of San José.

Icteria virens longicauda. Long-tailed Chat.

This beautiful bird is not uncommon along the watercourses, but is so shy that it is rarely seen. It nests in May and June.

Anthus pensilvanicus. American Pipit.

This larklike bird is a very abundant winter resident, arriving usually in October.

Cinclus mexicanus. American Dipper.

One not infrequently meets this bird when wandering along streams in the rougher parts of the county, though it does not breed here in nearly such numbers as among the redwoods of Santa Cruz county.

Minus polyglottos. Mockingbird.

On February 17, 1893, I shot a male mockingbird that had been living for some weeks in a small grove of peppers and cypresses near Stanford University. This is the only one I have seen. It bore no evidence of having been caged.

Harporhynchus redivivus. California Thrasher.

This common resident begins nest building usually in the first week in April. Its eggs—which sometimes are without markings—vary from two to four in number and may be found from the middle of April until the middle of May. The song is clear and powerful, and so frequently includes snatches from the songs and calls of other birds (among which are the flicker, housefinch, quail, goldfinch, black-headed grosbeak, etc.) that this species is often spoken of as the mountain mockingbird.

Thryomanes bewickii spilurus. Vigor's Wren.

Vigor's wren is a resident species, very common in winter and moderately common in summer. I have found fresh eggs as late as June 18 (1890).

Troglodytes ædon parkmanii. Parkman's Wren.

The earliest of these wrens usually arrive at Los Gatos about the middle of March. By the end of that month they are common

and in full song (during 1896 and 1897 I saw none). Nest building begins during the second half of April. I have found its five to eight eggs from May 9 to June 6 (1890).

Cistothorus palustris paludicola. Tule Wren.

The tule wren breeds in the marshes south of San José, but not very abundantly.

Parus inornatus. Plain Tit.

It can hardly be said that this tit is common at Los Gatos even in winter, though it is seen much more frequently then than during the breeding season. At Palo Alto, and probably in the oak region throughout the valley, it is a very common resident. It has, perhaps, a greater variety of notes than any other of our birds. Its eggs, usually, are seven, and are to be found in April. Occasionally, the nests are built in bird boxes.

Parus rufescens neglectus. California Chickadee.

In the coniferous woods southeast of Saratoga this chickadee is a very common resident and undoubtedly breeds. Straggling flocks occur irregularly near Los Gatos during nearly the whole year, but never are common.

Chamæa fasciata. Wren Tit.

This is a very common resident of the chaparral belt, where its curiously rattlelike call may be heard almost constantly. Its song is a series of beautifully clear whistled notes delivered at constantly lessening intervals, so that it has much the cadence of an ivory ball dropped on a slab of stone. Nest building begins about the middle of April (April 12, 1890) and fresh eggs may be found until late in June (June 20, 1889). Three to five eggs are laid, most frequently four.

Psaltriparus minimus californicus. California Bush Tit.

This is a very common resident. Nest building sometimes begins as early as the middle of February, but usually not until a month later. The nests vary in length from six and one-half inches to more than a foot. Their construction occupies the birds from one to three weeks (extremes are April 5–11 ; March 16–April 10), depending chiefly upon the abundance of material. Full sets contain from two to eight eggs, and may be found as late as June 16

(1888). When the eggs are taken the birds often remove the nest, bit by bit, to a new location. The following notes show that two broods are reared in the same nest:

April 24, 1888: Found bush tit's nest in live oak, ten feet from ground. May 4: After cutting the nest down and finding that it held five young birds, I tied it in place again. May 12: Young still in nest. June 16: Thinking the nest deserted I again cut it down, was surprised to find five eggs. The birds had stopped up the original hole, made another lower down, and relined the nest.

April 5, 1889. Bush tit's nest in live oak, nine feet from ground. Six young. April 21: Nest empty. April 27: Six eggs. April 28: Seven eggs. April 30: Eight eggs.

Regulus satrapa olivaceus. Western Golden-crowned Kinglet.

This kinglet is a rare winter visitant.

Regulus calendula. Ruby-crowned Kinglet.

This is a very common winter resident, arriving, ordinarily, in October and remaining until March or April.

Myadestes townsendii. Townsend's Solitaire.

A female shot at Los Gatos, February 11, 1893, is the only one observed.

Hylocichla ustulata œdica.

This is a very common summer resident, arriving in April and remaining until September (Mar. 24, 1899–Sep. 3, 1892). It nests very abundantly along watercourses, chiefly in June.

Hylocichla aonalaschkæ. Dwarf Hermit Thrush.

The dwarf thrush is extremely common from late in October (Nov. 7, 1888, Oct. 20, 1899, Oct. 30, 1891, Oct. 22, 1892) until after the thrushes of the *ustulata* type have appeared in the spring. I believe it does not nest in Santa Clara county, although it does among the redwoods a few miles farther west.

Merula migratoria propinqua. Western Robin.

The robin is a common migrant and winter resident, appearing usually in October (Oct. 16, 1887, Nov. 3, 1888, Oct. 9, 1889, Oct. 30, 1891) and remaining until the latter part of March (Mar. 21, 1888; Mar. 24, 1889). One appeared at Los Gatos August 8,

1893, and was seen almost daily until September 10. In November and December, 1889, immense flocks passed southward, almost without intermission for days at a time.

Hesperocichla nævia. Varied Thrush.

It usually is not until several weeks after the arrival of our other winter birds that the varied thrush appears at Los Gatos (Jan. 5, 1889; Dec. 24, 1889; Dec. 9, 1893). Often it is very common, but during the winter of 1889–90 I saw only three. My latest dates are March 22, 1888, and March 30, 1890.

Sialia mexicana occidentalis. Western Bluebird.

This bluebird is a common resident. Its nests may be found from the middle of April until June. In winter it associates with Lawrence's warbler and the pine, green-backed and willow goldfinches.

Sialia arctica. Mountain Bluebird.

The mountain bluebird sometimes occurs as a rare winter visitant.

SOME PASSAMAQUODDY WITCHCRAFT TALES.

BY J. DYNELEY PRINCE, PH.D.

(*Read November 17, 1899.*)

The following six tales of witchcraft were related to me during the summer of 1899 at Bar Harbour, Me., by Mr. Newell S. Francis, of the Passamaquoddy[1] tribe, now resident with his people, numbering some 500 to 600 souls in all, on their reservation at Pleasant Point, Me. (Pass. *Sĭbā́yĭk*). The chief interest of these stories lies in the facts, first, that they are the utterances of a comparatively intelligent Indian who firmly believes in the genuineness of the phenomena which he describes, and, secondly, that they were recorded by means of a phonograph, into which Mr. Francis spoke with great distinctness, thus enabling me to reproduce them with much greater phonetic exactness than if he had written them in the very imperfect system at present followed by the few Indians of this tribe who can write their language.

Any missionary to the Passamaquoddies, or to their kindred, the New Brunswick Maliseets, the Penobscots of Oldtown, Me., or the Micmacs and Abenakis of Quebec, will admit that belief in the ancient Shamanistic sorcery among these Indians has by no means died out. Among the Passamaquoddies and Maliseets[2] particularly there is still a perfect mine of material relating to the wizards and their power over other men and over the curious beings with which the Indians have peopled the mysterious forests of their country. It is to be regretted that more interest is not taken in this highly curious people, who in the course of fifty years are almost bound to disappear, but whose old men and women are still able to impart much that is very valuable both to the philologist and to the student of native American beliefs.[3]

[1] The word Passamaquoddy is a corruption of the Indian *Pĕstŭmwōkā́dyĭk*, the plural of the participial formation *Pĕstŭmwōk-ād* "he who catches the pollock-fish" from *Pĕskŭtŭm-wōk* "pollock-fish," + *-ād*, participial ending. Cf. Pŏnnămwōk-ād "he who catches frost-fish."

[2] The Maliseets, sometimes called St. John Indians, live in New Brunswick, on the river St. John. They are identical with the Maine Passamaquoddies in race and language. They are called in the native idiom: *Wŭlāstŭk-wĭyĭk* "Indians of the river St. John (*Wŭlāstŭk*)."

[3] See Prince, *Proc. Amer. Philos. Soc.*, xxxvi, pp. 479–495; *Annals N.Y. Acad. Sci.*, xi, pp. 369–377.

In pre-Christian times the Passamaquoddies, like their other Algic kindred, were Shamanists, worshipers of the demons of the wilderness and the lakes, and firm believers in the almost unlimited power of their *m'dēaulinwŭk* or wizards, many of whom still exist, subordinately, of course, to the Catholic doctrine, which nearly all the Indians profess. Francis informs me that there are only three or four Protestant Passamaquoddy families

A few specimens of these sorcerers' power are described below in the curiously curt style of Algic narrative. We see from the following tales that the wizards could transform themselves into animals at will (see tale i); that they could cast a spell or curse on an enemy, even though he might also be *m'dēaulin* (tale ii); that they could violate the laws of nature so far as to walk in hard ground, sinking up to the ankles or knees at every step (tale iii), and, finally, that they could communicate with each other telepathically (tale iv). I need hardly comment on the first two and the fourth of these wonders, as they are common among all Shamanistic conjurers, but the third phenomenon, *e. g.*, the power to sink into hard ground while walking, is, I believe, characteristically American. Rink states that this is not an unusual feat among the conjurers of the Greenland Eskimo, who frequently sink into rocky and frozen ground "as if in snow." The trick is probably done by some peculiar way of stooping. Leland compares here, however, the Old Norse statements regarding their wizards, who occasionally sank into the ground and who had power to pass through earth with the same ease as through air or water (*Algonquin Legends*, p. 342). It would be hardly permissible to draw a parallel between the ancient Norsemen and the northern Indians on this account, as the case he cites is that of a conjurer who disappeared into the ground *head downwards*, when he was stabbed at by a foe. It should be noticed that in the following tale, my authority did not *see* the actual feat, but only the deep tracks of the wizard where he had sunk into the earth "the night before," as Francis expressed it in his explanation.

The fifth anecdote, of a cannibalistic feast, is highly interesting. The wizards here eat their murdered comrade, evidently with the idea of absorbing into themselves some or all of his power. The cannibalistic orgies of the South Sea Islanders should be compared with this practice. For example, the Fijis and the Maoris of New Zealand ate their enemies with the same object in view, *e. g.*, to

become as brave as the fallen foe had been. All authorities tend to show, however, that cannibalism was extremely rare among the American races, and was only resorted to in isolated cases like the one here noted.

The sixth tale, of the *kĭwā'kw*, or snow-demon, is one of a great number. The Algic Indian believed in many spirits, some benevolent like the *w'nāg'mĕswăk* or little people, who were wont to warn the tribesmen of impending danger,[4] some harmless like the wandering *kĭwā'kw* or the *chĭb'lākwē*, the tree sprite, who sits in the crotch of the large branches, and some distinctly malevolent like the *ăppōd'mk'n* or spirit of the deep water who lurks in the lakes to drag down the unwary swimmer.

In the notation of the tales I have used the following system. The consonants are to be pronounced as in English, with the exception of *ţ* and *ķ*, which represent voiceless *tenues*; *ñ*, which is the French nasal *n*; *w'*, the whistled initial peculiar to the Pass., Abn. and Lenape, and ', which is a guttural voice-stop, not unlike the Semitic *ayin*. When *n* and *m* are written in juxtaposition to a following consonant they have their simple nasal tone-value. The vowels, whose exact quantity I have marked in the Passamaquoddy and Penobscot, have the Italian values, except in the case of the apostrophe, ', which is a very short *ŭ*, and *û*, which is equivalent to *oo* in "good."

The intonation of the Passamaquoddy dialect is difficult to acquire. In the narrative style, the syllables are spoken in what is nearly a monotone, until the tone syllable is reached, when the voice runs up a musical third and drops the same interval on the syllable after the accent. When a word has two accents, one following the other, as, for example, in *pŏhēgŭnŭl*, the first accented syllable is unusually prolonged in a sing-song tone and the second is marked by the voice-rise. These peculiarities are perfectly reproduced by the phonograph.

I have made the grammatical analysis following the tales, partly by means of a direct study of the Pass. itself and partly by means of a colloquial knowledge of the kindred Abenaki language of Canada, which is almost identical with the Penobscot idiom of Oldtown, Me., and is very close to the Lenape.

[4] Cf. Prince, *Annals N.Y. Acad. Sci.*, xi, p. 373.

I.

K'chī[1] Joe Bĕnōĭt m'dēaulĭn[2] pōhēgŭnŭl[3] k'chī k'nąkwchĭl.[4] Ūmątnntēnĭyāl[5] k'd'gĭl skĭţāpyĭl.[6] Pōhēgŭnŭl k'chī āt-hōzĭswŭl.[7] M'dēaulĭnwŭk nē'sēyĭk[8] t'lĭp'n'ltōwŭk. Kĭzĭp'n'ltĭtĭt[9] m'sĭdē nsēyō kŭspĕn.[10] Nŏdămĕn[11] Joe Bĕnōĭt kĭstāhāl[12] k'd'gĭl skĭţāpyĭl. Kĭzĭp'n'ltĭtĭt k'dŭk skĭţāp mē'chĭnē.[13]

II.

K'chī Lācōt(e) m'dēaulĭn k'chī Sābātĭssĭz'l[14] ūmątnţēnĭyāl. K'chī Lācōt(e), ūnājĭ'tŏn mskwĭglāhēgŏn k'chī'kŏk.[15] Kĭzĭ'tāq pĭzēssĭn. wtŭgwĕjĭ'tŏn wāgōnā'kwĕm. W'mājĕtauk kĕgĕskw. Wągōnā'kwĕm kwĭllhōgăn.[16] Ūkwūssĭz'l ūkĭgw'hŏgŏl (ūsĕb'mōyōgŏl). W'gĭchĭjĭtŏn[17] Lācōte Sābātĭssĭz'l ūm'dēaulĭnwĭk-p'nĭlkŏl.

III.

Nĭl nānānkō kĕsĭg'd'nĭyăn n'mĭhā skĭţāp m'dēaulĭn'wēū lĭwĭzō[18] Mĭ'kŭmwĕss. Nţĭōgŭn[19] ngĭzĭkwĕtkēūs[21] nągā ngĭzĭkĭnōslŭggŏn[22] ēd'lĭ kĭzĭkwĕtkēūsĕt. Nĭl n'mĭtŏn[23] ĕlāptāk[24] wējōsĕt.[25]

IV.

N'mĭtaukws[26] nōdwā ēd'lĭntauk nĭbāĭyū ōt'lĭntŭwēwāl wĭdāpyĭl. Ūnōdāgŏl ēd'lĭntauk-mĕdĕntākw pĭchĕdŏg ngwŭttā t'kĕssōsālkwŭt t'lĭgĕdŏnkē.

V.

Nzĭwĕs nt'lāg'nōd'māk pĭchē kĭskākĕsĭgd'n mątndŏltĭtĭt m'dēaulĭnwŭk. Pĕsk'wŏl[27] ūnĕp'hānţā. Ūmājĕp'hānţā Mnā'nŏk ēd'lĭ-spāsēgĕk. Nĭt ēd'lĭpŏltĭtĭt.

VI.

Nĭzwŭk skĭţāpyĭk t'lĭg'dŏnkĭyĭk kŭspēmŭk. Slākĭū ūnōd'wānţā wĕnĭl[29] măskwŭlāmĭyĭlĭjĭl ĕlmāg'mĕk mē'tāg'mĕk. Nōdausānţā—āpch ūnōd'wāniā măskwŭlāmĭyĭlĭjĭl. Ūnĭmĭyāwāl wĕchkŏyālĭjĭl. Mālūm'dē pĕchī'yĭl ēyī'tĭt. Ūtĭyānţā: p'lchĭnĕss mĭts.[30] Ŏ'tĭd'mŭn[31] yōt skĭţāp: kątāmā[32] ngĭzĭjĕnĕs-hĭyū tētĭnt'lĭ ēd'lĭt'kĕyĭk[33] lă'tōgwĕssnŭk. Yōt skĭţāp ĕlwĕ'kāl kĭwā'kw.

I.

Old Joe Benoit, the wĭzard, changed himself into a big turtle. He had quarreled with another man. The latter changed himself into a great serpent. The wizards fought together at *Nē'sēyĭk*.[8] After the fighting, the lake was all stirred up. I heard that Joe Benoit beat the other man. After the fight the other man died.

II.

Old Lacote, the wizard, quarreled with old Sabatis.[14] Old Lacote had made a dead-fall trap for bear in the woods. After he had made it, he crawled in (to test it). He pulled the prop-stick, touching it only a little. The prop-stick fell on him. His son (however) rescued him. Lacote knew that Sabatis had bewitched him.

III.

When I was fifteen years old, I saw a man who was a wizard He was called a *Mĭ'kŭmwĕss*[19] (a wood-devil). He told me that he had sunk into hard ground up to his ankles, and he showed me the place where he had done so. I saw the tracks where he had walked.

IV.

I heard my father (once) singing by night to his partner and he (the partner) heard him (my father) singing when he (the partner) was hunting a hundred miles away.

V.

My brother told me that many years ago certain wizards had a quarrel. They killed one (of their number). They brought him to Grand Manan,[28] where there was a steep ledge and there they ate him.

VI.

Two men were hunting on a lake. Suddenly they heard some one whooping along the lake, at the foot of the lake. They went out, and again they heard him whooping. They saw him coming. Right up he comes to where they are. They said to him: "Won't you eat?". That man said: "I cannot stop; I must go to where it is cold, to the north." That man must have been a *Kĭwā'kw*.[34]

GRAMMATICAL ANALYSIS.

[1] *K'chī* means properly "big," but in Pass. and Abn. it is frequently used for "old;" cf. Abn. *ādālī k'chīāwĭt* "he who is oldest" (participle). Oj. *kitchi*, Cree *ki'chi* mean "big." In Oj., however, the prefix *kete-*, clearly allied to *k'chĭ*, means "old." Both the Del. *chinge* "big" and *kikey* "old" (modern *kikes* "adults, parents") undoubtedly belong here. I doubt, however, whether we should compare with this root, as Brinton does (*Lenâpé*, pp. 102–4), the large class of derivatives in Del. beginning with *gisch-*, used to denote successful action, as in *gischigin* "to begin life, to be born;" *gischiton* "he makes it ready;" Abn. *kīzĭtō*, etc. The Cree *kije-* "perfect" (Lacombe, *Dict. de la Langue des Cris*, s. v.) may be cognate here.

[2] *M'dĕaulĭn* "wizard" appears in old Del. as *meteu* "one who drums," *e. g.*, a witch-doctor, referring to the practice of the medicine men of beating drums to drive away evil spirits. Thus, Del. *meteohet* is a drum or any hollow body. In mod. Del., *meteu* denotes a turkey-cock, which drums with its wings (so Anthony in Brinton, *Lenâpé Dict.*, p. 83). Cf. Oj. *mĕdĕwin* "sorcery" and *ţēwē-īgē* "he beats a drum" (*ţēwé-īgŭn* "drum").

[3] In *pŏhĕgŭnŭl* and the following word, we have the ending *-ŭl* of the obviative, or accus. of the third person, which appears in all the Algic idioms.

[4] *K'nákwchĭl* "turtle" (note the obv. *-ĭl* as object of *pŏhĕgŭnŭl*) is an exact cognate of abn. *Mĭkĕnākw* "turtle." Compare Micmac *mĭkchĭkch*, Oj. *mĭshĭkē* "turtle."

[5] *Ŭmāţnţēnĭyāl*, also in the obv., is clearly cognate with Del. *machtenalittin*, *machtayen* "to quarrel."

[6] In *skīţāp* "man" (*-yĭl*, obv. ending), sometimes *ŭskīţāp*, we evidently have the ending *-āpē*, which is used in Del. as the regular terminal to denote the human male. Thus, *lĕn-āpē* "a Del. Indian" (*lĕnno* "man" + *āpē*). With *lĕnno*, cf. Cr. *ilili*, Oj. *inini*. O. Abn. *ărēn-āñbē*, Mod. Abn. *ăln-ōmbā*, O. Narragansett *nin*, Naugatuck *rinh*, etc. Del. *kĭk-āpē*, "a bachelor," is formed in the same way. Brinton (*Len.*, p. 100) derives *-āpē* from a root *ap* "to cover sexually," which he states appears in Oj., used only of the lower animals. I cannot find it so applied. This *-āpē*, however, is found in O. Abn. *ărēn-āñbē*, Modern Abn. *ăln-ōmbā* (Penobscot *ăln-āmbā*) "indian," and in old Mass. *wuskelomp* "man," exactly equivalent to

Pass. *ūskĭţāp*. Cf. in this connection Pass. *n-ĭd-āp* Mod. Abn. *n-ĭd-ɔmbā* "my friend" (male). I find *nĭdōmbāskwā* "*mon amie*" in Abn. for the feminine. This *-āp* clearly appears also in Pass. *hĭy-āp* "buck" (male deer) and Mod. Abn. *nōmba-lkā* "cock." I am inclined to connect the first syllable of *ūskĭţāp* "man" (Mass. *wusketomp*) with the Abn. root *ūskĭ* "young," regarding the *ţ* as a mere connecting consonant.

[7] *Āthɔziswŭl* is a combination of *at-hō* + *zĭs* (*sĭs*), diminutive ending, + *-wŭl*, obv. termination. This may be connected with Del. *achgook* "snake," with which should be compared Abn. *s-kōg*.

[8] *Nē'sēyĭk* means "the muddy lake." The ending *-ĭk* is locative.

[9] *Kĭzĭp'nĭltĭtĭt*. *Kĭzĭ-*, sign of the past (also "can") from the verb *kĭzĭtō* "he makes," + *p'nĭl*, with which cf. Del. *linalittin* "fright," + the participial ending of the 3 p. pl. *-tĭtĭt*.

[10] *Kŭspĕn*, cf. *kŭspĕmŭk* in vi, probably from *kŭs-* "big" also "fast," and *-pē*, the termination denoting water seen in Abn. *sĭbō-bĭ* "river water." The Abn. word for water is *n'bĭ*, cf. Del. *mbi*, Oj. *n'bi*, etc. This appears in Pass. only in compounds such as *wĭkhĭg'n-nŭp* "book-water," *e. g.*, "ink." The regular Pass. expression is identical with the Micmac, *i. e.*, *sāmāgwān*. The element *kŭs-* appears in Abn. *k'kŭstōñgzĭn* "you talk big, *e. g.*, haughtily." Cf. also *Kŭz-ĭbiā* "paddle quickly."

[11] *Nŏdămĕn*, from *n'*, prefix of 1 p. sing., + √*nod*, + *amen* sign of the inanimate. Cf. Abn. *nŏdămĕn* "I hear" and Oj. *nūndāgē* "he hears" (is not deaf).

[12] *Kĭstāhāl* "he conquers him," perhaps cognate with Abn. *k'kĭs-tōnā-nā* "we decide, settle."

[13] *Mĕ'chĭnē*, cf. Abn. *māchĭnā* "he is dead."

[14] *Sābātĭssĭz'l* is the name *Sābātĭs*, the Indian corruption of Jean Baptiste, + the dim. ending *-sĭs*, + the obv. termination *'l,ul*.

[15] *K'chĭ'kŏk* "in the woods," with the loc. *-ŏk*, is, perhaps, cognate with the Del. *teke-ne-k* "in the woods." If so, we must suppose a metathesis *te-ke* = *k' -chĭ*, in which the *te* corresponds with the probably palatalized *-chi*.

[16] *Kwĭlthōgăn* is probably cognate with the Del. *quillutamen* "he falls upon it, attacks it."

[17] *W'gĭchĭjĭtŏn* "he knows," with inan. ending *-tŏn*, is perhaps cognate with Del. *kigin-amen* "he knows it," the Del. *-gi-* being represented by the palatalized *-chĭ-*, as in note 15.

[18] *Lĭwĭzō*; √*lĭwĭ* + *zō*, reflexive ending of 3 p. sg. Cf. Abn.

ndĕlĭwīzī "I am called; *kd-ɫlĭwī-t-ămĕn* "you call it," etc. The same root appears in Del. *wdellowunsowagan* "name." The Abn., however, drops the element *li* in the substantive *wĭzōwōnigān* "name."

[19] The *Mĭ'kûmwĕss* is a wood-spirit which may become the familiar of a wizard; the Passamaquoddies say, of a certain *m'dĕaulĭn; mĭ'kûmwĕss-û'kē* "he is partner with a *mĭ'kûmwĕss*. The wizard in this story was evidently in possession of such a familiar.

[20] *Nt̩ĭŏgŭn* consists of the prefix of the 1 p. sing. *n-*, the connecting consonant *-t-*, the root *ĭ* and the suffix *-gŭn* "he." For this root, cf. *n-t̩-ĭ-dăm* "I say;" Abn. *nd-ĭl-gŏn* "he says to me." The prefix *n-* and suffix *-gŭn* with the root infixed always mean "he .... to me;" cf. Abn. *ngĭz-ăgăkĭm-gŏn* "he taught me," and see below note 22.

[21] *Ngĭzĭk̩wĕlk̩ĕūs* is direct oration "I sank into the ground." *Kĭzĭ* (see above note 9) becomes *gĭzĭ* here by partial assimilation to the preceding nasal.

[22] *Ngĭzĭk̩ĭnōslŭggŏn* cf. the remarks above, note 20, on *nt̩ĭŏgŭn*.

[23] *N'mĭlŏn* "I see it" (inan.). The animate form is *n'mĭhā*, as above *n'mĭhā skĭt̩āp* "I see (him) a man."

[24] *Ĕlăpt̩āk*, cf. Abn. *ălŏmtŏk* "tracks which he made" (partc.).

[25] *Wĕjōsĕt*, partc. 3 p. "which he made."

[26] To illustrate the similarity between the Penobscot and Passamaquoddy, I give here the Penobscot version of this and the following anecdote. In the Pen. dialect every syllable receives equal voice-stress.

IV.

Nōdāwā n'mĭtaugŭs ɛdālĭntōkw nĭbaĭhĭ ōdālĭntōwĕwāl wĭdāmbāl. Ūnōdāngŏl wĭdāmbāl ɛdālĭntōkw nāwādōgē ngwŭdātkwē tkĕssōsōngwāt tāligădōnkē.

V.

Nĭjĭā ndōndōnkĕūkw nauwāt kĭzgōngĕsĭgād'n āwōdĭhĭdwāk m'dĕolĭnwāk. Pĕzgōwāl ūnĭ'hlāōnl. Ūmōnjip'hānā Mnā'nōgē ēdālĭ spāsēgĕk ēdālĭ pŏldĭhĭdĭt.

[27] *Pĕskwŏl* must of course be obviative as the object of the verb *ūnĕp'hānĭā* in the 3 p.

[28] *Manan*, Abn. *mĕnăhăn*, Pass. *m'nă'n*, means "island."

[29] *Wĕnĭl*, obv. case of *wĕn* "who, someone;" cf. Abn. *āwāni*, Del. *auwen*, Oj. *awēnēn*.

[30] Pass. *n'mĭts;* Abn. and Del. *n'mĭtzĭ* "I eat."

[33] This is a combination of *ŏ*, 3 p. prefix, the connecting consonant *t*, the root *ī* (see above note 20), and *-ămĕn*, the inanimate ending.

[34] *Ḳāṭāmā* "not." *Ḳāṭ* or *skāṭ* is the neg. element, cf. the Del. *taku*, an excellent example of metathesis.

[35] *Ēd'lī-t'kĕyĭk*. *Ēd'lī* is the relative particle "which, where;" *t'kĕ* appears in Abn. *t'kā*, Del. *tehek* (sbst.) "cold."

[36] The *kĭwā'kw* is essentially a cold demon, rejoicing in snow and ice. An old Indian told me that his father had seen one running on the snow-crust without snow shoes as swiftly as a deer.

Stated Meeting, December 1, 1899.

Vice-President SELLERS in the Chair.

Present, 23 members.

The resignation of Hon. Wayne McVeagh was read and on motion accepted.

Donations to the Library were announced and thanks were ordered therefor.

Prof. Lewis M. Haupt read a paper entitled "Failure of Dams and Reservoirs."

The annual reports of the Treasurer, the Curators and the Standing Committees were presented.

The Trustees of the Building Fund made a report, which was ordered to be spread upon the Minutes and referred to the Finance Committee.

The Society was then adjourned by the presiding officer.

Stated Meeting, December 15, 1899.

Vice-President SELLERS in the Chair.

Present, 30 members.

The Curators announced that the portrait of Dr. Rush had been restored and placed in the North room of the Society.

The death of Sir Rawson W. Rawson, of London, England, a member of the Society, was announced.

Prof. Haupt made the following remarks supplementary to his paper read October 6, "On the Results Secured at Aransas Pass, Tex., by the Reaction Breakwater:" (See page 135.)

As stated in the paper presented on October 6, the bids for the removal of the obstructing Government jetty were advertised on September 25 for thirty days. When they were opened it was found that there was but one bidder, that his bid was informal and in consequence the work was not undertaken.

On December 7, the Washington dispatches reported that Hon. Rudolph Klebery, representing the Aransas Pass district, introduced a bill into Congress to place the work under the continuing contract system, with authority to complete the double jetty plan as proposed by the U. S. Engineers which were estimated to cost $1,500,000, to create a channel by dredging and thus destroy the utility of a work which has already produced a navigable channel of fifteen feet M.L.W. at a cost of about one-twentieth the usual Government method, in much less time and without dredging. The channel is maintained by the currents, and is therefore relatively permanent.

A year will therefore soon have passed under a renewal of Government jurisdiction, with nothing further done toward the completion of the reaction breakwater.

The report of the Finance Committee was received.

The appropriations for the year 1900 were made.

The Society then held an election for members of the

Society, and the Tellers reported that the following gentlemen had been duly elected:

Coleman Sellers, Jr., Philadelphia.
Edwin Swift Balch, Philadelphia.
James Dewar, London, Eng.
Thomas C. Mendenhall, Worcester, Mass.
Daniel Baugh, Philadelphia.
Lindley M. Keasbey, Bryn Mawr.
L. W. Miller, Philadelphia.
Sir William Henry Preece, London, Eng.
Jacques Loeb, Chicago.
Charles Otis Whitman, Chicago.
Thomas Hunt Morgan, Bryn Mawr.
Henry Kraemer, Philadelphia.
Thomas Harvey Daugherty, Philadelphia.
Capt. Charles D. Sigsbee, U. S. N., Washington, D. C.
Barton C. Hirst, Philadelphia.
W. C. Broegger, Christiania, Norway.
Alexander Jay Wurts, Pittsburg, Pa.
Otis T. Mason, Washington, D. C.
Frederick W. True, Washington, D. C.
William H. Holmes, Washington, D. C.
A. B. Meyer, Dresden, Saxony.
Robert C. H. Brock, Philadelphia.
Gustave Schlegel, Leiden, Holland.
Albert Matthews, Boston, Mass.
J. Rodman Paul, Philadelphia.
Hugo A. Rennert, Philadelphia.
Edward Coles, Philadelphia.
J. Dundas Lippincott, Philadelphia.

Officers and Councillors for the ensuing year were nominated.

The Society was then adjourned by the presiding officer.

INDEX TO VOLUME XXXVIII.

Page.

Acetylene Diodide, Liquid 22
Appropriations for 1900 190
Aransas Pass, Tex., Results Secured at, by the Reaction Breakwater. 135
Australian Tribes, Divisions of North 75
Baird, Obituary of Col. Alexander Biddle 154
Barker, George F., Delegate to Stokes Jubilee. 155
Baur and Case, History of the Pelycosauria, with Description of Genus Dimetrodon. 23
Birds of Santa Clara County, Cal., Notes on 157
Book of the Dead 79
Breakwater, Reaction, Results of, Secured at Aransas Pass, Tex 135, 190
Brinton Memorial Meeting 155, 156
Buti, On an Interesting Fragment of the Book of the Dead. 79
Butterflies, Genealogical Trees of 147
Calendar of the Correspondence of Brigadier-General George Weedon, U. S. A., with Celebrated Characters of the American Revolution 81
of Richard Henry Lee and Arthur Lee 114
Carthagenian Tombstone 71
Catalogue of portraits and busts 154
of Scientific Literature, Committee on 23
Chabas, Invitation to Unveiling of Statue to 133
Chairman's Annual Discourse for 1899 49
Committee, Special, on Baur and Case's Paper. 23, 24
On Brinton Memorial 155, 156
On Buti's Paper. 132
On Catalogue of Scientific Literature 23
On Seeliger's Paper 7, 24
Committees, Standing. 21
Congress for Study of Popular Traditions, Invitation to. 134
Connecticut Academy of Arts and Sciences, Invitation to 100th Anniversary 133
Conversazione Proposed 22
Curators' Catalogue of Portraits and Busts 154
Dams and Reservoirs, Failure of 189
Dead, Book of the. 79
Dimetrodon, Description of the Genus 23
Divisions of North Australian Tribes, R. H. Mathews. 75
Dixon, Samuel G., Elected Councillor 75
Electricity, Transmission of Energy by 49
Energy, Transmission of, by Electricity. 49
Failure of Dams and Reservoirs. 189
Frazer, Obituary of E. D. Cope 22
Gold in the Glacial Drift of the Adirondacks 134
Goodwin, Presented an Engraving of John Vaughan. 75
Grote, On Genealogical Trees of Butterflies. 147
On Specializations of the Lepidopterous Wing; the Parnassi-Papilionidæ . . . 7, 25
Haupt, On the Results Secured at Aransas Pass, Tex., by the Reaction Breakwater . 135
Failure of Dams and Reservoirs 189

Page.

Hays, Note on William Penn's Commission for the Government of Pennsylvania during his First Visit to England in 1684 4
Elected Librarian 7
History of the Pelycosauria, with a Description of the Genus Dimetrodon 23
Imperial Academy of Sciences of St. Petersburg, Invitation to the 50th Anniversary of Establishment of Central Physical Observatory 24
Keiser, Liquid Acetylene Diodide 22
Lee Correspondence, Calendar of 114
Lepidopterous Wing, Specializations of 7, 25
Librarian Elected 7
Liquid Acetylene Diodide 22
Mathews, Divisions of North Australian Tribes 75
Meetings, Stated 3, 7, 21, 22, 23, 24, 71, 74, 131, 133, 154, 155, 156, 189, 190
Members Deceased:
Barcena, Don Mariano 154
Biddle, Alexander 74
Bonwill, W. G. A 134
Brinton, Daniel Garrison 134
Britton, J. Blodgett 22
Bunsen, Robert Wilhelm Eberhard 134
Daly, Charles P 134
Flower, Sir William Henry 134
Franks, Sir Augustus Wollaston 156
Goodfellow, Edward 132
Hoffman, Walter J 156
Hotchkiss, Jedediah 7
Kendall, Ezra Otis 3
Kiepert, Heinrich 155
Marsh, Othniel C 25
Orton, Edward 154
Rawlinson, George 155
Rawson, Sir Rawson W 190
Tatham, William P 134
Thomson, Frank 134
Tilghman, Richard A 25
Williams, Sir Monier-Monier 71
Members Elected:
Balch, Edwin Swift 191
Baugh, Daniel 191
Brock, Robert C. H 191
Broegger, W. C 191
Cadwalader, John 132
Coles, Edward 191
Dana, Charles E 132
Daugherty, Thomas Harvey 191
Davenport, Russell W 155
Davis, William Morris 154
Day, Frank Miles 155
Day, William C 132
Dewar, James 191
Greenman, Milton J 132
Hirst, Barton C 191
Holmes, William H 191
Keasbey, Lindley M 191
Keeler, James E 132
Kraemer, Henry 191
Lamberton, William A 132

Members elected: Page.
Learned, Marion D . . . 132
Lippincott, J. Dundas . . . 191
Loeb, Jacques . . . 191
MacKenzie, Arthur S . . . 132
Mason, Otis T . . . 191
Matthews, Albert . . . 191
Meigs, Arthur V. . . . 132
Mendenhall, Thomas C . . . 191
Meyer, A. B. . . . 191
Miller, Leslie W. . . . 191
Morgan, Thomas Hunt . . . 191
Morris, Harrison S. . . . 132
Morris, Israel W. . . . 132
Paul, J. Rodman . . . 191
Phillips, Francis C. . . . 132
Poincaré, Henri . . . 132
Preece, Sir William Henry . . . 191
Pritchett, Henry S . . . 132
Ramsay, William . . . 132
Rawle, William Brooke . . . 132
Remington, Joseph P . . . 132
Rennert, Hugo A . . . 191
Schlegel, Gustave . . . 191
Sellers, Coleman, Jr. . . . 191
Shapleigh, Waldron . . . 132
Sigsbee, Capt. Charles D., U. S. N . . . 191
Trevelyan, Sir George O. . . . 132
True, Frederick W. . . . 191
Vauclain, Samuel M . . . 132
Whitman, Charles Otis . . . 191
Wood, Stuart . . . 132
Wurts, Alexander Jay . . . 191

Membership, Resignation of:
Hon. Wayne McVeagh . . . 189
Meneghini, Guiseppe, Invitation to Unveiling of Monument to . . . 133
Mnemonics, New System of. . . . 7
Morris, On Carthagenian Tombstone . . . 73
North Australian Tribes, Divisions of . . . 75
Notes on Some Birds of Santa Clara County, California . . . 157

Obituaries ordered:
Brinton, Daniel G. . . . 155

Obituaries read:
Biddle, Alexander . . . 154
Bonwill, W. G. A . . . 156
Cope, E. D. . . . 22
Tilghman, Richard A. . . . 74
Parnassi, Papilionidæ . . . 7, 25
Passamaquoddy Witchcraft Tales . . . 181
Peirce, Obituary of Dr. W. G. A. Bonwill . . . 156
Pelycosauria, History of . . . 23
Penn's Commission for the Government of Pennsylvania during his First Visit to England in 1684, A note on. . . . 4
Prime, Gold in the Glacial Drift of the Adirondacks . . . 134
Prince, Some Passamaquoddy Witchcraft Tales. . . . 181
Rush, Dr., Portrait of . . . 190
Sellers, Transmission of Energy by Electricity. . . . 49

Page.
Smyth, Albert H., Appointed to Prepare Obituary Notice of Dr. Daniel G. Brinton . . 155
Stellwagen, On Tombstone brought from Carthage 71
Stokes Jubilee, George F. Barker Delegate to 155
Tilghman, Obituary Notice of 74
Translations of Papers published in another language not eligible for the Transactions or Proceedings 155
Van Denburgh, Notes on Some Birds of Santa Clara County, California 157
Vaughan, John, presentation of engraving of 75
Wadamori, On a New System of Mnemonics 7
Weedon Correspondence, Calendar of 81
Wistar, Obituary of Richard A. Tilghman 74

LIST OF MEMBERS

OF THE

American Philosophical Society

HELD AT PHILADELPHIA

FOR PROMOTING USEFUL KNOWLEDGE

(FOUNDED 1743)

January, 1900.

LIST OF MEMBERS

OF THE

AMERICAN PHILOSOPHICAL SOCIETY.

JANUARY, 1900.

A

Name.	*Date of Election.*	*Present Address.*
1687. ABBE, CLEVELAND, Prof.	July 27, 1871,	U. S. Weather Bureau, Washington, D. C.
2170. ABBOT, CHARLES CONRAD, M.D. .	Dec. 20, 1889,	Trenton, N. J.
1463. ABBOT, HENRY L., Gen. U. S. A.	April 18, 1862,	23 Berkeley St., Cambridge, Mass.
2311. ABBOTT, ALEXANDER C., M.D. . .	Feb'y 19, 1897,	Laboratory of Hygiene, University of Pennsylvania, Philadelphia.
1809. ÅCKERMAN, RICHARD, Prof. . . .	July 21, 1876,	Stockholm, Sweden.
1713. ACLAND, SIR HENRY, Bart. . . .	Jan'y 17, 1873,	Oxford, England.
2128. ADAM, LUCIEN.	Dec. 17, 1886,	41 Bard Sevigné, Rennes, France.
2081. ADAMS, HERBERT B., Prof. . . .	May 21, 1886,	Baltimore, Md.
1779. AGASSIZ, ALEXANDER, Prof. . . .	April 16, 1875,	Cambridge, Mass.
1642. AGASSIZ, MRS. ELIZABETH	Oct. 15, 1869,	Quincy St., Cambridge, Mass.
1860. ALISON, ROBERT HENRY, M.D. .	May 3, 1878,	Ardmore, Montgomery Co., Pa.
2380. ALLEN, ALFRED H.	May 20, 1898,	67 Surrey St., Sheffield, Eng.
1869. ALLEN, JOEL ASAPH, Prof. . . .	Sept. 20, 1878,	Am. Museum of Natural History, New York.
1927. AMES, REV. CHARLES G.	Jan'y 21, 1881,	12 Chestnut St., Boston, Mass.
2064. ANDERSON, GEORGE B., Lt. U.S.A.	Feb'y 19, 1886,	West Point, N. Y.
2164. ANGELL, JAMES B., Pres't.	Oct. 18, 1889,	Ann Arbor, Mich.
2224. APPLETON, WILLIAM HYDE, Prof.	May 19, 1893,	Swarthmore, Pa.
2102. ARGYLL, THE DUKE OF	May 21, 1886,	London, England.
1761. ARMSTRONG, THE RT. HON. LORD	July 17, 1874,	Cragside, Rothbury, England.
1996. ASHHURST, JOHN, JR., M.D. . . .	Jan'y 18, 1884,	2000 Delancey Pl., Phila.
2012. ASHHURST, RICHARD L.	April 18, 1884,	2204 Walnut St., Philadelphia.
2019. AVEBURY, LORD (SIR JOHN LUBBOCK)	July 18, 1884,	High Elms, Down, Kent, Eng.

B

	Name.	Date of Election.	Present Address.
1995.	BACHE, R. MEADE.	Jan'y 18, 1884,	4400 Sansom St., Philadelphia.
1832.	BACHE, THOMAS HEWSON, M.D.	Feb'y 2, 1877,	233 S. 13th St., Philadelphia.
2394.	BAER, GEORGE F.	Dec. 16, 1898,	Reading, Pa.
2285.	BAILEY, L. H., Prof.	May 15, 1896,	Cornell University, Ithaca, N.Y.
1630.	BAIRD, HENRY CAREY	Jan'y 15, 1869,	810 Walnut St., Philadelphia.
1991.	BAIRD, HENRY M., Prof.	Jan'y 18, 1884,	219 Palisade Ave., Yonkers, N.Y.
2419.	BALCH, EDWIN SWIFT.	Dec. 15, 1899,	1412 Spruce St., Philadelphia.
2345.	BALDWIN, JAMES MARK, Prof. . .	Oct. 15, 1897,	Princeton, N. J.
2191.	BALL, SIR ROBERT STAWELL . .	May 15, 1891,	Observatory, Cambridge, Eng.
1965.	DEBAR, HON. EDOUARD SÈVE . .	July 21, 1882.	Ramsgate, England.
1741.	BARKER, GEORGE F., Prof. . . .	April 18, 1873,	3909 Locust St., Philadelphia.
2011.	BARKER, WHARTON	April 18, 1884,	119 S. 4th St., Philadelphia.
1902.	BARTHOLOW, ROBERTS, M.D. . .	April 16, 1880,	1525 Locust St., Philadelphia.
2119.	BASTIAN, ADOLPH, Prof.	Dec. 17, 1886,	Königgrätzerstrasse 120, Berlin, Germany.
2421.	BAUGH, DANIEL	Dec. 15, 1899,	1601 Locust St., Philadelphia.
1934.	BEAULIEU, M. PAUL LEROY, Prof.	April 15, 1881,	27 Ave. duBois de Boulogne, Paris, France.
1968.	BELL, ALEXANDER GRAHAM, Prof.	July 21, 1882,	1331 Connecticut Ave., Washington, D. C.
1802.	BELL, SIR LOWTHIAN, Bart. . . .	April 21, 1876,	Northallerton, England.
2255.	BEMENT, CLARENCE S.	May 17, 1895,	1804 Spring Garden St., Phila.
2326.	DEBENNEVILLE, JAMES S	Oct. 15, 1897,	University Club, Philadelphia.
2264.	BERTHELOT, M. P. E. MARCELIN.	May 17, 1895,	Paris, France
2253.	BERTIN, GEORGES	May 17, 1895,	11 bis Rue Ballu, Paris.
1920.	BIDDLE, CADWALADER	Oct. 15, 1880,	1420 Walnut St., Philadelphia.
1831.	BIDDLE, HON. CRAIG	Feb'y 2, 1877,	2033 Pine Street, Philadelphia.
2134.	BILLINGS, JOHN S., M.D.	Feb'y 18, 1887,	40 Lafayette Place, New York.
2256.	BISPHAM, GEORGE TUCKER . . .	May 17, 1895,	1805 Delancey Place, Phila.
2157.	BLAIR, ANDREW A.	May 17, 1889,	406 Locust Street, Philadelphia.
1554.	BLAIR, THOMAS S.	Jan'y 19, 1866,	718 Bidwell St., Pittsburg, Pa.
1669.	BLAKE, WM. PHIPPS, Prof. . . .	Oct. 21, 1870,	Tucson, Arizona.
1700.	BLODGET, LORIN	April 19, 1872,	1329 S. Broad St., Philadelphia.
1444.	BÖHTLINGK, M. OTTO	Jan'y 17, 1862,	Seeburgstrasse 35, II, Leipzig.
2235.	BONAPARTE, PRINCE ROLAND . .	Feb'y 15, 1895,	10 Ave. d'Jena 22, Paris, France.
1126.	BOYÉ, MARTIN H., Prof.	Jan'y 17, 1840,	Coopersburg, Lehigh Co., Pa.
1826.	BRACKETT, CYRUS FOGG, Prof. . .	Feb'y 2, 1877,	Princeton, N. J.
2083.	BRANNER, JOHN C., Prof.	May 21, 1886,	Stanford Univ., Palo Alto, Cal.
2195.	BREZINA, ARISTIDES.	May 21, 1886,	VII Siebensterngasse, 46, Vienna, Austria.
2069.	BRINTON, JOHN H., M.D	Feb'y 19, 1886,	1423 Spruce St., Philadelphia.
2433.	BROCK, ROBERT C. H.	Dec. 15, 1899,	1612 Walnut St., Philadelphia.
2080.	BROOKS, WILLIAM KEITH, Prof. .	May 21, 1886,	Johns Hopkins Univ., Baltimore, Maryland.
1881.	BROWN, ARTHUR ERWIN	April 18, 1879,	1208 Locust St., Philadelphia.
2393.	BROWN, ERNEST WILLIAM, Prof.	Dec. 16, 1898,	Haverford College, Pa.
2275.	BRUBAKER, ALBERT P., M.D. . .	Oct. 18, 1895,	105 N. 34th St., Philadelphia.
1547.	BRUSH, GEORGE J., Prof.	Jan'y 20, 1865,	Yale Univ., New Haven, Conn.
2376.	BRYANT, HENRY GRIER.	May 20, 1898,	Room 805 Land Title Building, Philadelphia.
2237.	BRYCE, RIGHT HON. JAMES . . .	Feb'y 15, 1895,	54 Portland Place, London W., England.
2236.	BUDGE, E. A. WALLIS	Feb'y 15, 1895,	British Museum, London, Eng.
1653.	BULLOCK, CHARLES	Oct. 15, 1869,	1017 Clinton St., Philadelphia.
2007.	BURK, REV. JESSE Y	Jan'y 18, 1884,	400 Chestnut St., Philadelphia.
1988.	BUTLER, HON. WILLIAM	April 15, 1881,	West Chester, Pa.

C

	Name.	*Date of Election.*	*Present Address.*
1788.	CAMPBELL, JOHN LYLE, Prof. . .	July 16, 1875,	Crawfordsville, Ind.
1606.	CANBY, WILLIAM MARRIOTT . . .	Oct. 16, 1868,	1101 Delaware Avenue, Wilmington, Del.
2051.	CANNIZZARO, TOMMASO	Oct. 16, 1885,	Santa Maria fuori cinta, Casa Roffa, Messina, Sicily.
2416.	CADWALADER, JOHN	May 19, 1899,	1519 Locust St., Philadelphia.
1731.	CAPELLINI, GIOVANNI, Prof. . .	April 18, 1873,	Portovenere près Spezia, Italy.
1796.	CARLL, JOHN F.	Oct. 15, 1875,	Pleasantville, Venango Co., Pa.
1911.	CARSON, HAMPTON L.	April 16, 1880,	1033 Spruce St., Phila.
2260.	CARTER, HON. JAMES C	May 17, 1895,	54 Wall Street, New York City.
1707.	CASSATT, ALEXANDER J	Oct. 18, 1872,	Haverford, Del. Co., Pa.
2147.	CASTNER, SAMUEL, JR.	Dec. 16, 1887,	3729 Chestnut St., Philadelphia.
2152.	CATTELL, J. MCKEEN, Prof. . . .	May 18, 1888,	Garrison-on-Hudson, N. Y.
1908.	CHANCE, HENRY MARTYN, M.D .	April 16, 1880,	4123 Parkside Ave., Phila.
1783.	CHANDLER, C. F., Prof. . .	April 16, 1875,	Columbia Univ., N. Y. City.
1778.	CHAPMAN, HENRY C., M.D. . . .	April 16, 1875,	2047 Walnut St., Philadelphia.
2132.	DE CHARENCEY, COMTE HYACINTH	Dec. 17, 1886,	25 rue Barbet de Jouy, Paris, France.
2158.	CLARK, CLARENCE H.	May 17, 1889,	42d and Locust Sts., Phila.
1717.	CLARKE, THOMAS	Jan'y 17, 1873,	127 Duane St., New York, N.Y.
1983.	CLAYPOLE, E. W., Prof.	Jan'y 19, 1883,	Pasadena, Cal.
2247.	CLEEMANN, RICHARD A., M.D . .	Feb'y 15, 1895,	2135 Spruce St., Philadelphia.
2336.	CLEVELAND, HON. GROVER. . . .	Oct. 15, 1897,	Westland, Princeton, N. J.
1999.	COHEN, J. SOLIS, M.D.	Jan'y 18, 1884,	1341 Walnut St., Philadelphia.
2429.	COLES, EDWARD	Dec. 15, 1899,	1734 Chestnut St., Philadelphia.
2305.	CONKLIN, EDWIN GRANT, Prof. .	Feb'y 19, 1897,	University of Penna., Phila.
2386.	CONVERSE, JOHN H.	May 20, 1898,	500 N. Broad St., Philadelphia.
2257.	COOK, JOEL	May 17, 1895,	819 N. Broad St., Philadelphia.
2129.	CORA, GUIDO, Prof.	Dec. 17, 1886,	Corso Vittorio Emanuele, 74, Turin, Italy.
1662.	COX, HON. JACOB D.	April 15, 1870,	Cincinnati, O.
2207.	CRAMP, CHARLES H	Dec. 16, 1892,	507 S. Broad St., Philadelphia.
1836.	CRANE, THOMAS FREDERICK, Prof.	Feb'y 2, 1877,	Cornell Univ., Ithaca, N. Y.
2100.	CROOKES, SIR WILLIAM	May 21, 1886,	7 Kensington Park Gardens, London, W., England.
2388.	CROWELL, EDWARD P., Prof. . .	Dec. 16, 1898,	21 Amity St., Amherst, Mass.
2172.	CRUZ, HON. FERNANDO, M.D. . .	Dec. 20, 1889,	Washington, D. C.
2317.	CULIN, STEWART	May 21, 1897,	University of Penna., Philadelphia.
1439.	CURWEN, JOHN, M.D.	April 18, 1861,	Warren, Pa.
2296.	CUSHING, FRANK HAMILTON. . .	May 15, 1896,	Bureau of Ethnology, Washington, D. C.

D

1567.	DA COSTA, J. M., M.D	Oct. 19, 1866,	1700 Walnut St., Philadelphia.
2361.	DALL, WILLIAM H.	Dec. 17, 1897,	U. S. National Museum, Washington, D. C.
2402.	DANA, CHARLES E.	May 19, 1899,	2013 DeLancey Place, Philadelphia.
2282.	DANA, EDW. S., Prof.	May 15, 1896,	Yale Univ., New Haven, Conn
1806.	DANNEFELD, C. JUHLIN	April 21, 1876,	27 Gt. Winchester St., London.
2369.	DARWIN, GEORGE HOWARD, Prof.	Feb'y 18, 1898,	Newham Grange, Cambridge, England.
2425.	DAUGHERTY, THOMAS HARVEY .	Dec. 15, 1899,	School House Lane, Germantown, Philadelphia.

	Name	*Date of Election.*	*Present Address.*
1811.	DAVENPORT, SIR SAMUEL	Oct. 20, 1876,	Beaumont, Adelaide, S. Australia.
1557.	DAVIDSON, GEORGE, Prof.	Jan'y 19, 1866,	2221 Washington St., San Francisco, Cal.
2417.	DAVIS, WILLIAM MORRIS.	Oct. 20, 1899,	Cambridge, Mass.
1923.	DAWKINS, WILLIAM BOYD, Prof.	Oct. 15, 1880,	Woodhurst, Fallowfield, Manchester, England.
2418.	DAY, FRANK MILES	Oct. 20, 1899,	801 Penn Mutual Building, Philadelphia.
2406.	DAY, WILLIAM C., Prof.	May 19, 1899.	Swarthmore, Pa.
2360.	DE GARMO, CHARLES, Prof. . . .	Dec. 17, 1897,	Cornell Univ., Ithaca, N. Y.
2208.	DERCUM, FRANCIS X., M.D. . . .	Dec. 16, 1892,	1719 Walnut St., Philadelphia.
2434.	DEWAR, JAMES, Prof.	Dec. 15, 1899,	The Royal Institution, London, England.
2013.	DICKSON, SAMUEL	April 18, 1884,	901 Clinton St., Philadelphia.
2208.	DIXON, SAMUEL G., M.D., Pres't .	Dec. 16, 1892,	1900 Race St., Philadelphia.
2108.	DOLLEY, CHARLES S., M.D. . . .	Dec. 17, 1886,	3707 Woodland Ave., Phila.
2089.	DONNER, OTTO, Prof.	May 21, 1886,	Helsingfors, Finland.
1946.	DOOLITTLE, C. L., Prof.	Oct. 21, 1881,	Upper Darby, Delaware Co., Pa.
1839.	DOUGLAS, JAMES	April 20, 1877,	Spuytenduyvil, NewYork, N.Y.
1924.	DRAPER, DANIEL	Oct. 15, 1880,	Meteorological Observatory, Central Park, New York.
2303.	DREER, FERDINAND J.	Feb'y 19, 1897,	1520 Spruce St., Philadelphia.
1787.	DROWN, THOMAS M., Pres't . . .	July 16, 1875,	Lehigh Univ., S. Bethlehem, Pa.
1918.	DU BOIS, PATTERSON	Oct. 15, 1880,	1031 Walnut St., Philadelphia.
1878.	DUDLEY, CHARLES BENJAMIN . .	Jan'y 17, 1879,	Drawer 334, Altoona, Blair Co., Pa.
2063.	DUNCAN, LOUIS, U. S. N.	Feb'y 19, 1886,	Johns Hopkins University, Baltimore, Md.
1573.	DUNNING, GEORGE F.	Jan'y 18, 1867,	Farmington, Conn.
1727.	DUPONT, EDOUARD	April 18, 1873,	Royal Museum, Bruxelles.
2227.	DUPONT, HENRY A.	Feb'y 16, 1894,	Winterthur, Montchanen, Del.
1679.	DUTTON, CLARENCE E., Capt. U.S.A.	Jan'y 20, 1871,	U. S. Arsenal, Washington, D.C.

E

2105.	EASTON, MORTON W., Prof. . . .	Dec. 17, 1886,	224 S. 43d St., Philadelphia.
1917.	ECKFELDT, JACOB B	Oct. 15, 1880,	U. S. Mint, Philadelphia.
1825.	EDDY, H. TURNER, Prof	Feb'y 2, 1877,	University of Minnesota, Minneapolis, Minn.
2294.	EDISON, THOMAS A.	May 15, 1896,	Orange, N. J.
2262.	EDMUNDS, HON. GEORGE F. . . .	May 17, 1895,	1724 Spruce St., Philadelphia.
1686.	ELIOT, CHARLES W., Pres't	April 21, 1871,	17 Quincy St., Cambridge, Mass.
2272.	ELLIOTT, A. MARSHALL, Prof. . .	May 17, 1895,	Baltimore, Md.
2313.	ELY, THEODORE N.	May 21, 1897,	Broad St. Station, Phila.
2356.	EMERSON, BENJ. KENDALL, Prof.	Dec. 17, 1897,	Amherst, Mass.
2368.	EMMET, W. L. R	Feb'y 18, 1898,	Schenectady, N. Y.
1981.	EMMONS, S. F., Prof	Jan'y 19, 1883,	U. S. Geological Survey, Washington, D. C.
1943.	EVANS, SIR JOHN, K.C.B.	Oct. 21, 1881,	Nash Mills, Hemel Hempstead, England.
2254.	EWELL, MARSHALL D., M.D . . .	May 17, 1895,	59 Clark St., Chicago, Ill.

F

2234.	FENNELL, C	Feb'y 15, 1895,	Cambridge, England.
2180.	FIELD, ROBERT PATTERSON . . .	May 16, 1890,	218 S. 42d St., Philadelphia.
2364.	FINE, HENRY B., Prof	Dec. 17, 1897,	Princeton, N. J.

	Name.	*Date of Election.*	*Present Address.*
2353.	FISHER, SYDNEY GEORGE	Dec. 17, 1897,	328 Chestnut St., Philadelphia.
1901.	FLINT, AUSTIN, JR., M.D.	April 16, 1880,	14 W. 33d St., New York, N.Y.
2197.	FORBES, GEORGE, Prof.	Oct. 16, 1891,	34 GreatGeorge St., S.W. London.
2390.	FORD, PAUL LEICESTER.	Dec. 16, 1898,	247 Fifth Ave., New York City.
1170.	FRALEY, HON. FRED., LL.D. . .	July 15, 1842,	2017 Delancey Place, Phila.
1912.	FRALEY, JOSEPH C.	April 16, 1880,	1833 Pine St., Philadelphia.
1695.	FRAZER, PERSIFOR, Dr. ès-Sc. Nat.	Jan'y 19, 1872,	928 Spruce St., Philadelphia.
2101.	FRAZIER, BENJ. W., Prof. . . .	Dec. 18, 1896,	Lehigh Univ., Bethlehem, Pa.
2171.	FRIEBIS, GEORGE, M.D.	Dec. 20, 1889,	1906 Chestnut St., Philadelphia.
2179.	FULLERTON, GEORGE S., Rev. . .	May 16, 1890,	89, The Gladstone, Philadelphia.
1739.	FULTON, JOHN	April 18, 1873,	136 Park Pl., Johnstown, Pa.
1914.	FURNESS, HORACE H., Dr.	April 16, 1880,	Wallingford, Del. Co., Pa.
2306.	FURNESS, HORACE HOWARD, JR..	Feb'y 19, 1897,	2034 Delancey Place, Phila.
2304	FURNESS, WILLIAM H., 3d, M.D. .	Feb'y 19, 1897,	Wallingford, Del. Co., Pa.
	G		
1988.	GARRETT, PHILIP C	April 20, 1883,	Logan P. O., Philadelphia.
2079.	GATES, MERRILL E.	May 21, 1886,	Amherst, Mass.
1025.	GATSCHET, ALBERT S.	Oct. 17, 1884,	1331 F St., N. W., Washington, D. C.
1897.	GEIKIE, SIR ARCHIBALD	Jan'y 16, 1880,	28 Jermyn St., London, S. W., England.
1803.	GEIKIE, JAMES, Prof	April 21, 1876,	31 Merchiston Ave., Edinburgh, Scotland.
2067.	GENTH, F. A., JR	Feb'y 19, 1886,	103 N. Front St., Philadelphia.
2274.	GIBBS, J. WILLARD, Prof.	May 17, 1895,	121 High St., New Haven, Conn.
1355.	GIBBS, OLIVER WOLCOTT, Prof. .	July 21, 1854,	158 Gibbs Ave., Newport, R. I.
1587.	GILL, THEODORE N., M.D.	July 19, 1867,	Smithsonian Inst., Washington, D. C.
1800.	GILMAN, DANIEL C., Pres't. . . .	April 21, 1876,	25 N. Charles St., Baltimore, Md.
2240.	GLAISHER, JAMES W. L.	Feb'y 19, 1895,	The Shola, Heathfield Road, South Croydon, England.
2233.	GLAZEBROOK, RICHARD T	Feb'y 15, 1895,	4 Sunnyside, Princes Park, Liverpool, England.
2212.	GOODALE, GEORGE LINCOLN, Prof.	Feb. 17, 1893,	10 Craigie St., Cambridge, Mass.
2292.	GOODSPEED, ARTHUR W., Prof.	May 15, 1896,	Univ. of Pennsylvania, Philadelphia.
2203.	GOODWIN, HAROLD.	May 20, 1892,	3927 Locust St., Philadelphia.
2232.	GOODWIN, W. W., Prof.	Feb'y 15, 1895,	Cambridge, Mass.
1851.	GRAY, ELISHA.	Jan'y 18, 1878,	220 Kinzie St., Chicago, Ill.
2222.	GREEN, SAMUEL A., M.D.	Oct. 20, 1893,	Historical Soc., Boston, Mass.
1504.	GREEN, WILLIAM HENRY.	April 17, 1863,	Princeton, N. J.
1880.	GREENE, WILLIAM H., M.D. . . .	April 18, 1879,	27 S. 5th St., Philadelphia.
2412.	GREENMAN, MILTON J., M.D. . .	May 19, 1899,	Wistar Institute, 36th and Darby Road, Philadelphia.
2155.	DE GREGORIO, MARCHESE ANTONIO	Dec. 21, 1888,	Al Molo, Palermo, Sicily.
2188.	GREGORY, CASPAR RÉNÉ, Prof. .	May 15, 1891,	Naunhofstrasse 25, Marienhöhe, Leipzig-Stotteritz, Germany.
1815.	GROTE, AUGUSTUS RADCLIFFE . .	Oct. 20, 1876,	Buffalo, N. Y.
2090.	DE GUBERNATIS, ANGELO, Prof . .	May 21, 1886,	Florence, Italy.
1438.	DE GUYANGOS, DON PASCUAL . .	April 19, 1861,	London, England.
	H		
2054.	HAECKEL, ERNST, Prof.	Oct. 16, 1885,	University, Jena, Germany.
1658.	HALE, REV. EDW. EVERETT . . .	Jan'y 21, 1870,	39 Highland St., Roxbury, Mass.

	Name.	*Date of Election.*	*Present Address.*
1853.	HALL, ASAPH, Prof.	Jan'y 18, 1878,	U. S. Observatory, Washington, D. C.
1795.	HALL, CHARLES EDWARD. . . .	Oct. 15, 1875,	Westport, Essex County, N. Y.
2397.	HALL, CHARLES M.	Dec. 16, 1898,	Niagara Falls, N. Y.
2027.	HALL, LYMAN B., Prof.	Jan'y 16, 1885,	Haverford Coll., Haverford, Pa.
2194.	HAMY, E. T.	May 15, 1891,	40 Rue Lübeck, Ave. du Trocadero, Paris, France.
1337.	HARDING, GEORGE	Jan'y 20, 1854,	2 36 Chestnut St., Phila.
2136.	HARRIS, JOSEPH S.	May 20, 1887,	144 School Lane, Germantown.
2246.	HARRISON, CHARLES C., Provost.	Feb'y 15, 1895,	1618 Locust St., Philadelphia.
1827.	HART, JAMES MORGAN, Prof. . .	Feb'y 2, 1877,	I Reservoir Ave., Ithaca, N. Y.
2378.	HARKNESS, WILLIAM, Prof. . . .	May 20, 1898,	Georgetown Heights, Washington, D. C.
2365.	HATCHER, JOHN B., Prof. . . .	Dec. 17, 1897,	31 Vandeventer Ave., Princeton, N. J.
1764.	VON HAUER, FRANZ RITTER. . .	Oct. 16, 1874,	Leoben, Austria.
1681.	HAUPT, HERMANN.	April 21, 1871,	The Concord, Washington, D.C.
1862.	HAUPT, LEWIS M., Prof.	May 3, 1878,	107 N. 35th St., Philadelphia.
2082.	HAYES, RICHARD SOMERS, Capt.	May 21, 1886,	32 Nassau St., New York, N.Y.
2071.	HAYS, I. MINIS, M.D.	Feb'y, 19, 1886,	266 S. 21st St., Philadelphia.
2395.	HAY, JOHN, Hon.	Dec. 16, 1898,	State Dep't, Washington, D.C.
1985.	HEILPRIN, ANGELO, Prof	April 20, 1883,	Acad. of Natural Sciences, Philadelphia.
2283.	HENDERSON, C. H	May 15, 1896,	Chestnut Hill, Philadelphia.
2218.	HEWETT, WATERMAN T., Prof. .	May 19, 1893,	Cornell Univ., Ithaca, N. Y.
2266.	HEYSE, PAUL, Ph.D.	May 17, 1895,	Munich, Bavaria.
2349.	HILDEBURN, CHARLES R	Oct. 15, 1897,	Care of J. S. Morgan & Co., London, England.
2307.	HILLER, H. M., M.D.	Feb'y 19, 1897,	Care of Charles Hiller, Esq., Kohoka, Mo.
2110.	HILPRECHT, HERMANN V., Prof.	Dec. 17, 1886,	403 S. 41st St., Philadelphia.
1768.	HIMES, CHARLES FRANCIS, Prof. .	Oct. 16, 1874,	Dickinson Coll., Carlisle, Pa.
2438.	HIRST, BARTON COOKE, M.D. . .	Dec. 15, 1899,	1821 Spruce St., Philadelphia.
1663.	HITCHCOCK, CHAS. HENRY, Prof.	April 15, 1870,	Dartmouth Coll., Hanover, N.H.
2355.	HOLDEN, EDWARD S.	Dec. 17, 1897,	Smithsonian Institution, Washington, D. C.
2068.	HOLLAND, JAMES W., M.D. . . .	Feb'y 19, 1886,	2006 Chestnut St., Philadelphia.
2440.	HOLMES, WILLIAM H., Prof. . . .	Dec. 15, 1899,	U. S. National Museum, Washington, D. C.
1624.	HOOKER, SIR JOSEPH D.	Jan'y 15, 1869,	The Camp, Sunningdale, Eng.
2224.	HOPPIN, J. M., Prof.	Oct. 20, 1893,	New Haven, Conn.
2070.	HORNER, INMAN.	Feb'y 19, 1886,	1811 Walnut St., Philadelphia.
1696.	HOUGH, GEORGE W., Prof. . . .	Jan'y 19, 1872,	N.W. University, Evanston, Ill.
1698.	HOUSTON, EDWIN J., Prof. . . .	Jan'y 19, 1872,	1809 Spring Garden St., Phila.
2346.	HOWE, HENRY M., Prof.	Oct. 15, 1897,	27 W. 73d St., New York.
2239.	HUGGINS, SIR WILLIAM, K. C. B .	Feb'y 15, 1895,	90 Upper Tulse Hill, S. W. London.
1843.	HUMPHREY, H. C.	July 20, 1877,	?
2248.	HUNTER, RICHARD S.	Feb'y 15, 1895,	1413 Locust St., Philadelphia.
2373.	HUTCHINSON, EMLEN	May 20, 1898,	2006 Delancey Place. Phila.
2231.	HYATT, ALPHEUS, Prof.	Feb'y 15, 1895,	Francis Ave., Cambridge, Mass.
1426.	HYRTL, JOSEPH, Prof.	July 20, 1860,	k. k. Akad. d. Wissenschaften, Vienna, Austria.

I

1773.	INGHAM, WM. ARMSTRONG.	April 16, 1875,	320 Walnut St., Philadelphia.
2221.	D'INVILLIERS, EDWARD VINCENT.	May 19, 1893,	711 Walnut St., Philadelphia.

J

Name.	*Date of Election.*	*Present Address.*
2010. JAMES, EDMUND J., Prof.	April 18, 1884,	Univ. of Chicago, Chicago, Ill.
1933. JANNET, CLAUDIO	April 15, 1881,	11 Rue las Casas, Paris, France.
2302. JASTROW, MORRIS, JR., Prof. . . .	Feb. 19, 1897,	248 S. 23d St., Philadelphia.
2375. JAYNE, HENRY LA BARRE	May 20, 1898,	1826 Chestnut St., Phila.
2049. JAYNE, HORACE, M.D	Oct. 16, 1885,	318 S. 19th St., Philadelphia.
1954. JEFFERIS, WILLIAM W	Jan'y 20, 1882,	442 Central Park West, New York.
2017. JORDAN, FRANCIS, JR.	April 18, 1884,	111 N. Front St., Philadelphia.

K

1989. KANE, ELISHA KENT.	April 20, 1883,	Kushequa, Pa.
2322. KARPINSKY, ALEX. PETROVITCH, Prof.	May 21, 1897,	Geological Survey, St. Petersburg, Russia.
2169. KEANE, JOHN J., Right Rev. . .	Dec. 20, 1889,	Washington, D. C.
2422. KEASBEY, LINDLEY M., Prof. . .	Dec. 15, 1899,	Bryn Mawr, Pa.
2329. KEEN, GREGORY B.	Oct. 15, 1897,	3237 Chestnut St., Philadelphia.
2021. KEEN, WILLIAM W., M.D., Prof.	July 18, 1884,	1729 Chestnut St., Philadelphia.
2392. KEISER, EDWARD H., Prof. . . .	Dec. 16, 1898,	Bryn Mawr, Pa.
1723. KELVIN, LORD.	April 18, 1873,	The Library, The University, Glasgow, Scotland.
2278. KENNELLY, A. E., D.Sc	Feb. 28, 1896,	Crozer Building, 1420 Chestnut St., Philadelphia.
1708. KING, CLARENCE	Oct. 18, 1872,	18 Wall St., New York, N. Y.
1767. KÖNIG, GEORGE A., Prof.	Oct. 16, 1874,	School of Mines, Houghton, Mich.
2389. KNIGHT, WILLIAM A., Prof. . . .	Dec. 16, 1898,	St. Andrew's, Scotland.
2424. KRAEMER, HENRY, Prof.	Dec. 15, 1899,	145 N. 10th St., Philadelphia.
2167. KRAUSS, FRIEDERICH S., Ph.D. .	Dec. 20, 1889,	VII Neustiftgasse 12, Vienna, Austria.

L

1694. LAMBERT, GUILLAUME, Prof. . .	Jan'y 19, 1872,	Univ. of Louvain, Belgium.
2411. LAMBERTON, WILLIAM A., Prof .	May 19, 1899,	University of Penna., Phila.
2377. DE LANCEY, EDWARD F	May 20, 1898,	20 E. 28th St., New York, N. Y.
2344. LANCIANI, RUDOLFO, Prof	Oct. 15, 1897,	2 Via Goito, Rome, Italy.
1858. LANDRETH, BURNET.	Jan'y 18, 1878,	Bristol, Pa.
1781. LANGLEY, SAMUEL P., Sec'y. . .	April 16, 1875,	Smithsonian Institution, Washington, D. C.
1721. LA ROCHE, C. PERCY, M.D. . . .	Jan'y 17, 1873,	1518 Pine Street, Philadelphia.
1974. LAWES, SIR JOHN B., Bart. . . .	Jan'y 19, 1883,	Rothamsted, St. Albans, Eng.
1595. LEA, HENRY CHARLES.	Oct. 18, 1867,	2000 Walnut St., Philadelphia.
2407. LEARNED, MARION D., Prof . . .	May 19, 1899,	University of Penna., Phila.
1737. LE CONTE, JOSEPH, Prof.	April 18, 1873,	Univ. of California, Berkeley, Cal.
1986. LEHMAN, AMBROSE E.	April 20, 1883,	711 Walnut St., Philadelphia.
2182. LELAND, CHARLES G.	May 16, 1890,	Baring Bros. & Co., London.
2174. LE MOINE, HON. J. M.	Dec. 20, 1889,	Quebec, Canada.
2324. LEONARD, JAMES B.	Oct. 15, 1897,	The Lincoln, Philadelphia.
1382. LESLEY, J. PETER, Prof.	July 13, 1856,	Milton, Mass.
2085. LEVASSEUR, EMILE, Prof.	May 21, 1886,	26, Rue Mons le Prince, Paris, France.
1415. LEWIS, FRANCIS W., M.D.	Jan'y 20, 1860,	2016 Spruce St., Philadelphia.
2300. LEWIS, G. ALBERT	Dec. 18, 1896,	1834 Delancey Place, Phila.

	Name.	*Date of Election.*	*Present Address.*
2338.	LIBBEY, WILLIAM, Prof.	Oct. 15, 1897,	20 Bayard Ave., Princeton, N.J.
2432.	LIPPINCOTT, J. DUNDAS	Dec. 15, 1899,	1333 Walnut St., Philadelphia.
2312.	LISTER, THE RIGHT HON. LORD .	May 21, 1897,	12 Park Crescent, Portland Place, London, England.
1756.	LOCKYER, SIR JOSEPH NORMAN, K. C. B.	April 17, 1874,	Royal College of Science, S. Kensington, London S. W., England.
2435.	LOEB, JACQUES, Dr.	Dec. 15, 1899,	University of Chicago, Chicago, Ill.
1728.	LONGCHAMPS, BARON DE SELYS .	April 18, 1873,	Liège, Belgium.
1872.	LONGSTRETH, MORRIS, M.D. . . .	Sept. 20, 1878,	1416 Spruce St., Philadelphia.
2202.	LOW, HON. SETH	Feb. 19, 1892,	Columbia College, New York.
2350.	LOWELL, PERCIVAL	Oct. 15, 1897,	Lowell Observatory, Flagstaff, Arizona.
2003.	LUDLOW, WILLIAM, Col. U. S. A.	Jan'y 18, 1884,	War Dept., Washington, D.C.
1629.	LYMAN, BENJAMIN SMITH	Jan'y 15, 1869,	708 Locust St., Philadelphia.

M

2319.	MABERY, CHARLES F., Prof. . . .	May 21, 1897,	57 Adelbert St., Cleveland, O.
2107.	MACALISTER, JAMES, Pres't. . . .	Dec. 17, 1886,	119 N. 18th St., Philadelphia.
2209.	MACFARLANE, JOHN M., Prof. . .	Dec. 16, 1892,	Lansdowne, Delaware Co., Pa.
2404.	MACKENZIE, ARTHUR S., Prof. . .	May 19, 1899,	Bryn Mawr, Pa.
2363.	MCCAY, LEROY W., Prof.	Dec. 17, 1897,	Princeton, N. J.
2366.	MCCLURE, CHARLES F. W., Prof .	Dec. 17, 1897,	Princeton, N. J.
2280.	MCCOOK, HENRY C., Rev., D.D. .	Feb. 23, 1896,	3700 Chestnut St., Philadelphia.
1888.	MCCREATH, ANDREW S.	July 18, 1879,	223 Market St., Harrisburg, Pa.
1821.	MCKEAN, WILLIAM V.	Feb'y 2, 1877,	200 N. 19th St., Philadelphia.
2299.	MAGIE, WM. FRANCIS, Prof. . . .	Dec. 19, 1896,	Princeton, N. J.
2339.	MAHAN, ALFRED T., Capt. U. S. N.	Oct. 15, 1897,	160 W. 86th St., New York.
2042.	MALLET, JOHN WM., M.D. . . .	Jan'y 16, 1885,	University of Virginia, Charlottesville, Va.
1847.	MANSFIELD, IRA FRANKLIN . . .	Jan'y 18, 1878,	Cannelton, Beaver Co., Pa.
1857.	MARCH, FRANCIS ANDREW, Prof.	Jan'y 18, 1878,	Lafayette College, Easton, Pa.
1861.	MARKS, WILLIAM D., Prof. . . .	May 3, 1878,	Westport, Essex Co., N. Y.
2078.	MARSHALL, JOHN, M.D	May 21, 1886,	1718 Pine St., Philadelphia.
2184.	MASCART, E., Prof.	Dec. 19, 1890,	176 Rue de l'Université, Paris, France.
1572.	MASON, ANDREW	Jan'y 18, 1867,	30 and 32 Wall St., New York.
2431.	MASON, OTIS T., Prof.	Dec. 15, 1899,	Washington, D. C.
2279.	MASON, WM. PITTS, M.D., Prof. .	Feb. 28, 1896,	Rensselaer Polytechnic Institute, Troy, N. Y.
2196.	MASPERO, GASTON, Prof.	May 15, 1891,	Paris, France.
2427.	MATTHEWS, ALBERT.	Dec. 15, 1899,	145 Beacon St., Boston, Mass.
1486.	MAX-MUELLER, PROF., RT. HON. FRIEDRICH.	Jan'y 16, 1863,	University of Oxford, Oxford, England.
1677.	MEEHAN, THOMAS	Jan'y 20, 1871,	Germantown, Philadelphia.
2399.	MEIGS, ARTHUR V., M.D.	May 19, 1899,	1322 Walnut St., Philadelphia.
2115.	VON MELTZEL, HUGO, Prof. Dr. .	Dec. 17, 1886,	Koloszvar, Hungary.
2339.	MELVILLE, GEO. W., Como. U.S.N.	Oct. 15, 1897,	Navy Dept., Washington, D. C.
2430.	MENDENHALL, THOMAS C , Prof.	Dec. 15, 1899,	Worcester, Mass.
2387.	MENGARINI, GUGLIELMO, Prof . .	May 20, 1898,	Rome, Italy.
2251.	MERCER, HENRY C.	Feb. 15, 1895,	Doylestown, Pa.
1903.	MERRICK, JOHN VAUGHAN	April 16, 1880,	Roxborough, Philadelphia.
1947.	MERRIMAN, MANSFIELD, Prof. .	Oct. 21, 1881,	Lehigh Univ., Bethlehem, Pa.

	Name.	*Date of Election.*	*Present Address.*
1744.	MESSCHERT, MATTHEW HUIZINGA.	Oct. 17, 1873,	Douglassville, Berks Co., Pa.
2436.	MEYER, A. B., Prof.	Dec. 15, 1899,	K. Zoölogisches u. Anthropologisch-Ethnographisces Museum, Dresden, Germany.
2142.	MICHAEL, MRS. HELEN ABBOTT .	May 20, 1887,	44 Mt. Vernon St., Boston, Mass.
2423.	MILLER, LESLIE W., Prof.	Dec. 15, 1899,	N. W. cor. Broad and Pine Sts., Philadelphia.
2284.	MINOT, CHAS. SEDGWICK, M.D. .	May 15, 1896,	Harvard Univ., Cambridge, Mass.
2175.	MITCHELL, HON. JAMES T. . . .	Feb'y 21, 1890,	1722 Walnut St., Philadelphia.
1461.	MITCHELL, S. WEIR, M.D	Jan'y 17, 1862,	1524 Walnut St., Philadelphia.
2267.	MONTEGAZZA, PAOLO	May 17, 1895,	Florence, Italy.
2367.	MONTGOMERY, THOMAS H., Jr . .	Feb'y 18, 1898,	Wistar Institute, 36th and Darby Road, Philadelphia.
2323.	MOORE, CLARENCE B.	Oct. 15, 1897,	1321 Locust Street, Phila.
2029.	MOORE, JAMES W., M.D.	Jan'y 16, 1885,	Lafayette College, Easton, Pa.
1841.	MOREHOUSE, GEORGE R., M.D. .	April 20, 1877,	2033 Walnut St., Philadelphia.
2340.	MORLEY, FRANK, Prof.	Oct. 15, 1897,	Haverford, Pa.
2409.	MORRIS, HARRISON S.	May 19, 1899,	Academy of Fine Arts, Philadelphia.
2397.	MORRIS, ISRAEL W.	May 19, 1899,	225 So. 8th St., Philadelphia.
1976.	MORRIS, J. CHESTON, M.D. . . .	Jan'y 19, 1883,	1514 Spruce St., Philadelphia.
2265.	MORSE, EDWARD S., Prof. . . .	May 17, 1895,	Essex Institute, Salem, Mass.
1577.	MORTON, HENRY, Pres't.	Jan'y 18, 1867,	Hoboken, N. J.
2121.	MUCH, MATHÆUS, Ph.D.	Dec. 17, 1886,	XIII Penzingerstrasse, 84, Vienna, Austria.
1866.	MUHLENBERG, REV. FRED A. . .	Sept. 20, 1878,	34 S. 5th St., Reading, Pa.
2192.	MUNROE, CHARLES E., Prof. . .	May 15, 1891,	Columbian Univ., Washington, D. C.
2062.	MURDOCK, J. B., Lieut. U.S.N. .	Feb'y 19, 1886,	Navy Dept., Washington, D.C.
1937.	MURRAY, JAMES A. H.	April 15, 1881,	Sunnyside, Banbury Road, Oxford, England.

N

2087.	DE NADAILLAC, MARQUIS.	May 21, 1886,	18 Rue Duphot, Paris, France.
2316.	NANSEN, FRIDTJOF	May 21, 1897,	Godthaab, Lysaker, Norway.
1852.	NEWCOMB, SIMON, Prof.	Jan'y 18, 1878,	Washington, D. C.
1703.	NICHOLS, STARR HOYT	July 19, 1872,	64 Exchange Place, New York, N. Y.
2060.	NIKITIN, SERGE, Chief Geol. . .	Feb'y 19, 1866,	Geological Survey, St. Petersburg, Russia.
1805.	NORDENSKIÖLD, ADOLF ERIC, Prof.	April 21, 1876,	Stockholm, Sweden.
1712.	NORRIS, ISAAC, M.D.	Oct. 18, 1872,	Fair Hill, Bryn Mawr, Pa.
2106.	NORRIS, WILLIAM F., M.D. . . .	Dec. 17, 1886,	1530 Locust St., Philadelphia.
2046.	NORTH, EDWARD, LL.D., Prof. .	Oct. 16, 1885,	Hamilton College, Clinton, N.Y.
2269.	NUTTALL, MRS. ZELIA	May 17, 1895,	Care of London County Bank, Oxford, England.

O

2072.	OLIVER, CHARLES A., M.D. . . .	Feb'y 19, 1886,	1507 Locust St., Philadelphia.
2354.	OLNEY, RICHARD, Hon	Dec. 17, 1897,	23 Court Street, Boston.
2195.	OPPERT, JULIUS, Prof.	May 15, 1891,	Paris, France.
2362.	ORTMANN, ARNOLD E., Prof. . . .	Dec. 17, 1897,	66 Williams St., Princeton, N.J.
2135.	OSBORN, HENRY F., Prof.	Feb'y 18, 1887,	American Museum of Natural History, New York.
2039.	OSLER, WILLIAM, M.D	Jan'y 16, 1885,	1 West Franklin St., Baltimore, Md.

P

	Name.	*Date of Election.*	*Present Address.*
1868.	PACKARD, A. S., M.D.	Sept. 20, 1878,	Providence, R. I.
1578.	PACKARD, JOHN H., M.D.	Jan'y 18, 1867,	Hotel Stenton, Philadelphia.
2396.	PANCOAST, HENRY S	Dec. 16, 1898,	267 E. Johnson St., Germantown, Phila.
2035.	PATTERSON, C. STUART.	Jan'y 16, 1885,	1000 Walnut St., Philadelphia.
2385.	PATTERSON, LAMAR GRAY	May 20, 1898,	176 Washington St., Cumberland, Md.
1282.	PATTERSON, ROBERT	April 18, 1851,	329 Chestnut St., Philadelphia.
1320.	PATTERSON, THOMAS LEIPER	April 15, 1853,	176 Washington St., Cumberland, Md.
2213.	PATTISON, ROBERT E., Hon	Feb. 17, 1893,	5930 Drexel Rd., Overbrook, Pa.
2357.	PATTON, FRANCIS L., D.D., Pres't	Dec. 17, 1897,	Princeton, N. J.
2428.	PAUL, J. RODMAN	Dec. 15, 1899,	903 Pine St., Philadelphia.
1772.	PEARSE, JOHN B.	Jan'y 15, 1875,	317 Walnut Av., Roxbury, Mass.
2318.	PECKHAM, S. F., Prof.	May 21, 1897,	Ann Arbor, Mich.
1859.	PEIRCE, C. NEWLIN	May 3, 1878,	1415 Walnut St., Philadelphia.
1722.	PEMBERTON, HENRY	Jan'y 17, 1873,	1947 Locust St., Philadelphia.
2104.	PEÑAFIEL, ANTONIO	May 21, 1886,	Ciudad, Mexico, Mexico.
2073.	PENNYPACKER, SAMUEL W., Hon.	May 21, 1886,	1540 N. 15th St., Philadelphia.
1518.	PENROSE, R. A. F., M.D.	July 17, 1863,	1331 Spruce St., Philadelphia.
2059.	PEPPER, EDWARD, M.D.	Feb'y 19, 1886,	El Afia, El Biar, Alger, Algerie
2333.	PEPPER, GEORGE WHARTON	Oct. 15, 1897,	701 Drexel Building, Phila.
2383.	PETTEE, WILLIAM HENRY, Prof.	May 20, 1898,	554 Thomson St., Ann Arbor, Mich.
2281.	PETTIT, HENRY	Feb. 28, 1895,	5951 Overbrook Ave., Philadelphia.
2261.	PHELPS, EDWARD J., Hon.	May 17, 1895,	Burlington, Vt.
2403.	PHILLIPS, FRANCIS C., Prof.	May 19, 1899,	P. O. Box 126, Allegheny, Pa.
2295.	PICKERING, EDW. C., Prof.	May 15, 1896,	Harvard Univ., Mass.
2342.	PIERSOL, GEORGE A., M.D.	Oct. 15, 1897,	Chester Ave. and 49th St., Philadelphia.
2277.	PILSBRY, HENRY A., Prof.	Dec. 20, 1895,	Academy of Natural Sciences, Philadelphia.
2374.	PLATT, CHARLES.	May 20, 1898,	237 S. 18th St., Philadelphia.
1760.	PLATT, FRANKLIN	July 17, 1874,	1617 Chestnut St., Philadelphia.
2127.	PLATZMANN, JULIUS, Ph.D.	Dec. 17, 1886,	Reichsstrasse 2, Leipzig, Germany.
2415.	POINCARÉ, HENRI, Prof.	May 19, 1899,	Rue Claude Bernard, Paris, France.
2053.	POMIALOWSKY, JOHN, Prof.	Oct. 16, 1885,	St. Petersburg, Russia.
1539.	PORTER, THOMAS C., Rev.	Oct. 21, 1864,	Paxinosa Ave., Easton, Pa.
2097.	POSTGATE, JOHN P., Prof.	May 21, 1886,	Cambridge, England.
2161.	POWELL, J. W.	Oct. 18, 1889,	910 M. St., N. W., Washington, D. C.
2437.	PREECE, SIR WILLIAM HENRY	Dec. 15, 1899,	13, Queen Anne's Gate, London, S. W., England.
2382.	PRESCOTT, ALBERT B., Prof.	May 20, 1898,	734 S. Ingalls St., Ann Arbor, Mich.
1780.	PRIME, FREDERICK	April 16, 1875,	1008 Spruce St., Philadelphia.
2414.	PRITCHETT, HENRY S.	May 19, 1899,	U. S. Coast Survey, Washington, D. C.
1758.	PUMPELLY, RAPHAEL	April 17, 1874,	Newport, R. I.
2293.	PUPIN, MICHAEL I., Prof.	May 15, 1896,	7 Highland Pl., Yonkers, N. Y.
2268.	PUTNAM, F. W., Prof.	May 15, 1895,	Peabody Museum, Cambridge, Mass.

R

	Name.	*Date of Election.*	*Present Address.*
2131.	RADA, JUAN DE DIOS-Y DELGADO,	Dec. 17, 1886,	Calle de la Corredera baja de S. Pablo No. 12, Madrid, Spain.
2401.	RAMSAY, WILLIAM, Prof.	May 19, 1899,	University College, Gower St., W. C., London, Eng.
1736.	RAND, THEODORE D	April 18, 1873,	Radnor, Del.Co., Pennsylvania.
1849.	RANDALL, F. A., M.D.	Jan'y 18, 1878,	Warren, Pa.
2391.	RAWLE, FRANCIS.	Dec. 16, 1898,	"The Lincoln," Philadelphia.
2398.	RAWLE, WILLIAM BROOKE. . . .	May 19, 1899,	230 So. 22d St., Philadelphia.
2099.	RAYLEIGH, JOHN W. S., LORD . .	May 21, 1886,	Terling Pl., Witham, Essex, Eng.
1784.	RAYMOND, ROSSITER W.	April 16, 1875,	99 John St., New York, N. Y.
2381.	REDWOOD, BOVERTON	May 20, 1898,	4, Bishopsgate St., Withim, London, England.
2405.	REMINGTON, JOSEPH P., Prof. . .	May 19, 1899,	1832 Pine St., Philadelphia.
1889.	REMSEN, IRA, Prof.	July 18, 1879,	Johns Hopkins Univ., Baltimore, Md.
1948.	RENARD, A. F., Prof.	Oct. 21, 1881,	Acad. of Sciences, Brussels, Belgium.
1343.	RENARD, CHARLES, M.D.	Jan'y 20, 1854,	Moscow, Russia.
1890.	RENEVIER, E., Prof.	July 18, 1879,	Univ. Lausanne, Switzerland.
1816.	REULEAUX, F., Prof.	Feb'y 2, 1877,	Ahornstrasse 2, Berlin, Germany.
2122.	RÉVILLE, ALBERT, Prof.	Dec. 17, 1886,	21 Rue Guénégaud, Paris, France.
2315.	RHOADS, SAMUEL NICHOLSON . .	May 21, 1897,	Academy of Natural Sciences, Philadelphia.
2226.	ROBERTS, ISAAC	Oct. 20, 1893,	Starfield, Crowborough, Sussex, England.
1957.	ROBINS, JAMES W., Rev	April 21, 1882,	2023 Pine St., Philadelphia.
1390.	ROGERS, FAIRMAN	Jan'y 16, 1857,	Univ. of Pennsylvania, Philadelphia.
2177.	ROGERS, ROBERT W., Prof. . . .	Feb'y 21, 1890,	Drew Theological Seminary, Madison, N. J.
1462.	ROHRIG, F. L. OTTO, Prof.	April 18, 1862,	Los Angeles, Cal.
2050.	ROLLETT, HERMANN, Ph.D. . . .	Oct. 16, 1885,	Baden bei Wien, Austria.
1907.	ROOD, OGDEN N., Professor . . .	April 16, 1880,	Columbia College, New York.
2198.	ROSENGARTEN, JOSEPH G.	Oct. 16, 1891,	1704 Walnut St., Philadelphia.
1964.	DE ROSNY, LÉON, Prof.	July 21, 1882,	47 Ave. Duquêsne, Paris, France.
1838.	ROTHROCK, JOSEPH T., Prof. . .	April 20, 1877,	West Chester, Pa.
2291.	ROWLAND, HENRY A., Prof. . .	May 15, 1896,	Johns Hopkins Univ., Baltimore
1620.	RÜTIMEYER, CARL L., Prof. . . .	Jan'y 15, 1869,	Basle, Switzerland.

S

2230.	SACHSE, JULIUS F.	Feb'y 16, 1894,	4428 Pine St., Phila.
1766.	SADTLER, SAMUEL P., Prof. . . .	Oct. 16, 1874,	1042 Drexel Building, Phila.
2148.	SAJOUS, CHARLES E., M.D	Feb'y 17, 1888,	2043 Walnut St., Philadelphia.
2358.	SAMPSON, ALDEN.	Dec. 17, 1897,	Haverford, Pa.
1563.	SANDBERGER, FREDOLIN, Prof. .	April 20, 1866,	Univ. of Würtzburg, Bavaria.
2327.	SANDERS, RICHARD H.	Oct. 15, 1897,	1225 Locust St., Philadelphia.
1958.	SARGENT, CHARLES SPRAGUE, Prof.	April 21, 1882,	Jamaica Plain, Mass.
1730.	SAUSSURE, HENRI DE.	April 18, 1873,	Geneva, Switzerland.
2211.	SCHÄFFER, CHARLES, M.D. . . .	Feb'y 17, 1893,	1309 Arch St., Philadelphia.
1498.	SCHOTT, CHARLES ANTHONY, Prof.	April 17, 1863,	U. S. Coast and Geodetic Survey, Washington, D. C.
1864.	SCHURZ, CARL, Hon	Sept. 20, 1878,	54 William St., New York, N.Y.

	Name.	*Date of Election.*	*Present Address.*
1725.	SCLATER, PHILIP LUTLEY	April 18, 1873,	3 Hanover Square, London, W. England.
2372.	SCOTT, C. F.	Feb'y 18, 1898,	Pittsburgh, Pa.
2112.	SCOTT, W. B., Prof.	Dec. 17, 1886,	Princeton, N. J.
1870.	SCUDDER, SAMUEL HUBBARD. . .	Sept. 20, 1878,	Cambridge, Mass.
2352.	SEE, T. J. J., LL.D.	Dec. 17, 1897,	Lowell Observ., Flagstaff, Ariz.
1704.	SELLERS, COLEMAN.	July 19, 1872,	3301 Baring St., Philadelphia.
3420.	SELLERS, COLEMAN, JR.	Dec. 15, 1899,	410 N. 33d St., Philadelphia.
1533.	SELLERS, WILLIAM.	April 15, 1864,	Clifton, Edgemoor, Delaware.
1770	SELWYN, ALFRED R. C., LL.D. .	Oct. 16, 1874,	28 Nepean St., Ottawa, Canada.
2057	SERGI, GIUSEPPE, Prof.	Oct. 16, 1885,	Università Romana, Rome, Italy
2410.	SHAPLEIGH, WALDRON	May 19, 1899,	2223 Delancey Pl., Philadelphia.
2076.	SHARP, BENJAMIN, M.D.	May 21, 1886,	317 N. 35th St., Philadelphia.
1944.	SHARPLES, PHILIP PRICE	Oct. 21, 1881,	West Chester, Pennsylvania.
1960.	SHARPLES, STEPHEN PASCHALL. .	April 21, 1882,	13 Broad St., Boston, Mass.
1797.	SHERWOOD, ANDREW	Oct. 15, 1875,	Mansfield, Tioga Co., Penna.
1822.	SHIELDS, CHAS. W., Rev., D.D. .	Feb y 2, 1877,	Princeton, N. J.
2351.	SMITH, A. DONALDSON, M.D . . .	Oct. 15, 1897,	Care of S. H. Thomas, 210 S. 4th St., Phila.
2146.	SMITH, EDGAR F., Prof, ...	Oct. 21, 1887,	210 S. 37th St., Philadelphia.
1789.	SMITH, STEPHEN, M.D	Oct. 15, 1875,	57 W. 42d St., New York, N. Y.
2335.	SMOCK, JOHN C., Prof.	Oct. 15, 1897,	Trenton, N. J.
2141.	SMYTH, ALBERT H., Prof. . .	May 20, 1887,	Radnor, Delaware Co., Pa.
2229.	SNELLEN, HERMAN, JR., Ph.D. .	Feb'y 16, 1894,	Utrecht, Netherlands.
1742.	SNOWDEN, A. LOUDON	Oct. 17, 1873,	1812 Spruce St., Philadelphia.
2009.	SNYDER, MONROE B., Prof. . . .	Jan'y 18, 1884,	2402 N. Broad St., Philadelphia.
1720.	SPOFFORD, A. R., ...	Jan'y 17, 1873,	Washington, D. C.
2332.	SQUIBB, EDWARD R., M.D	Oct. 15, 1897,	152 Columbia Heights, Brooklyn, N. Y.
1949.	STALLO, HON. JOHN B.	Oct. 21, 1881,	Cincinnati, O.
2348.	STEPHENS, H. MORSE, Prof. . . .	Oct. 15, 1897,	Cornell Univ., Ithaca, N. Y.
1990.	STEVENS, WALTER LECONTE, Prof.	Jan'y 18, 1884,	Rensselaer Polytechnic Institute, Troy, N. Y.
1840.	STEVENSON, JOHN JAMES, Prof. .	April 20, 1877,	University Heights, New York, N. Y.
2276.	STEVENSON, SARA Y.	Oct. 18, 1895,	237 S. 21st St., Philadelphia.
2371.	STILLWELL, L. B.	Feb'y 18, 1898,	Buffalo Ave., Niagara Falls, N.Y.
2168.	STOKES, SIR GEORGE G., Bart. .	Dec. 20, 1889,	Lensfield Cottage, Cambridge, England.
2193.	STUBBS, RT. REV. WILLIAM, Lord Bishop of Oxford	May 15, 1891,	Cleveden Palace, Oxford, Eng.
2094.	SUESS, EDWARD, Prof.	May 21, 1886,	Geol. Reichsanstalt, Vienna, Austria.
2258.	SULZBERGER, MAYER, Hon. . . .	May 17, 1895,	1303 Girard Ave., Philadelphia
2092.	SZOMBATHY, JOSEF, Prof.	May 21, 1886,	Burgring 7, Vienna, Austria.

T

2328.	TATHAM, WILLIAM	Oct. 15, 1897,	1811 Walnut St., Philadelphia.
2243.	TAYLOR, ISAAC, Rev.	Feb'y 15, 1895,	York, England.
2098.	TEMPLE, RICHARD CARNAC, Lt.-Col.	May 21, 1886,	Port Blair, Andeman Islands.
2289.	TESLA, NIKOLA	May 15, 1896,	46 E. Houston St., New York.
2006.	THOMAS, ALLEN C., Prof.	Jan'y 18, 1884,	Haverford, Pa.
1993.	THOMPSON, HEBER S.	Jan'y 18, 1884,	Pottsville, Pa.
1726.	THOMPSON, SIR HENRY.	April 18, 1873,	35 Wimpole St., Cavendish Square, London, England.

	Name.	*Date of Election.*	*Present Address.*
1807.	THOMSON, ELIHU, Prof.	April 21, 1876,	Swampscott, Mass.
1909.	THOMSON, WILLIAM, M.D.	April 16, 1880,	1426 Walnut St., Philadelphia
2052.	IM THURN, EVERARD F.	Oct. 16, 1885,	Pomeroon River, Georgetown, British Guiana, S. A.
1530.	THURY, A., Prof.	April 15, 1864,	Univ. of Geneva, Switzerland.
2379.	TIELE, D. P., Prof.	May 20, 1898,	Stationsveg 23, Leyden.
1688.	TILGHMAN, BENJAMIN C.	July 21, 1871,	1114 Girard St., Philadelphia.
1657	TILGHMAN, WILLIAM M.	Jan'y 21, 1870,	1114 Girard St., Philadelphia.
2176.	TIMMINS, SAMUEL	Feb. 21, 1890,	Arley, near Coventry, England.
2123.	TOPINARD, PAUL, Prof.	Dec. 17, 1886,	105 Rue de Rennes, Paris.
2065.	TOPPAN, ROBERT NOXON.	Feb'y 19, 1886,	54 Highland St., Cambridge, Mass.
2249.	TOWER, CHARLEMAGNE, JR., Hon.	Feb'y 15, 1895,	U. S. Embassy, St. Petersburg, Russia.
2413.	TREVELYAN, GEORGE OTTO, Rt.-Hon. Sir	May 19, 1899,	8 Grosvenor Crescent, S. W., London, England.
2288.	TROWBRIDGE, JOHN, Prof.	May 15, 1896,	Harv. Univ., Cambridge, Mass.
2024.	TRUMBULL, HENRY C., Rev., D.D.	July 18, 1884,	1031 Walnut St., Philadelphia.
2321.	TSCHERNYSCHEW, THEODORE. . .	May 21, 1897,	Geological Survey, St. Petersburg, Russia.
1973.	TSCHERMAK, GUSTAV.	Oct. 20, 1882,	Universität, Vienna, Austria.
1529.	V. TUNNER, PETER R., Prof. . . .	April 15, 1864,	Leoben, Austria.
1983.	TURRETTINI, THEODORE, Prof .	Dec. 19, 1890,	Geneva, Switzerland.
2166.	TUTTLE, DAVID K	Oct. 18, 1889,	U. S. Mint, Philadelphia.
2163.	TYLER, LYON G., Pres't	Oct. 18, 1889,	Williamsburg, Va.
2138.	TYSON, JAMES, M.D	May 20, 1887,	1506 Spruce St., Philadelphia.

U

2185.	UNWIN, WILLIAM C., Prof.	Dec. 19, 1890,	7 Palace Gate Mansions, London, England.

V

2400.	VAUCLAIN, SAMUEL M.	May 19, 1899,	1533 Green St., Philadelphia.
2325.	VAUX, GEORGE, JR.	Oct. 15, 1897,	404 Girard Building, Phila.
2045.	DE VERE, M. SCHELE, Prof. . . .	Oct. 16, 1885,	University of Virginia, Charlottesville, Va.
1475.	VIRCHOW, RUDOLPH, Prof. . . .	Oct. 17, 1862,	Universität, Berlin, Germany.
1670.	VOSE, GEORGE L., Prof.	Oct. 21, 1870,	Massachusetts Institute of Technology, Boston.
2186.	VOSSION, LOUIS	Dec. 19, 1890,	Consulate of France, Honolulu.

W

2034.	WAGNER, SAMUEL	Jan'y 16, 1885,	Greenbank Farm, West Chester, Pa.
1748.	WAHL, WILLIAM H.	Jan'y 16, 1874,	15 S. 7th St., Philadelphia.
2331.	WALCOTT, CHARLES D.	Oct. 15, 1897,	U. S. Geological Survey, Washington, D. C.
1724.	WALLACE, ALFRED RUSSEL. . . .	April 18, 1873,	Parkstone, Dorset, England.
2156.	WARD, LESTER F.	May 17, 1889,	1464 Rhode Island Ave., Washington, D. C.
1925.	WARE, LEWIS S	Jan'y 21, 1881,	Phila. Book Co., 15 S. 9th St., Phila.
2359.	WARFIELD, ETHELBERT D., Pres't	Dec. 17, 1897,	Easton, Pennsylvania.

	Name.	*Date of Election.*	*Present Address.*
2033.	WEIL, EDWARD HENRY	Jan'y 16, 1885,	1720 Pine St., Philadelphia.
2028.	WEISBACH, ALBIN, Prof.	Jan'y 16, 1885,	Bergakad, Freiberg, Saxony.
2286.	WELCH, WILLIAM H., M.D. . . .	May 15, 1896,	935 St. Paul St., Baltimore, Md.
1639.	WHARTON, JOSEPH.	April 16, 1869,	P. O. Box 1332, Philadelphia.
1637.	WHITE, ANDREW D., Prof. . . .	April 16, 1869,	Cornell Univ., Ithaca, N. Y.
1848.	WHITE, ISRAEL C., Prof.	Jan'y 18, 1878,	119 Wiley St., Morguntown, W. Va.
2384.	WHITEFIELD, R. P., Prof. . . .	May 20, 1898,	American Museum of Natural History, New York.
2439.	WHITMAN, CHARLES OTIS, Prof. .	Dec. 15, 1899,	The University of Chicago, Chicago, Ill.
1863.	WILDER, BURT G., Prof	May 3, 1878,	60 Cascadilla Pl., Ithaca, N. Y.
2250.	WILLCOX, JOSEPH	Feb. 15, 1895,	"The Gladstone," Philadelphia.
2347.	WILLIAMS, EDWARD H., JR., Prof.	Oct. 15, 1897,	Lehigh Univ., Bethlehem, Pa.
2151.	WILLIAMS, TALCOTT	May 18, 1888,	916 Pine Street, Philadelphia.
2178.	WILLIS, HENRY, Prof.	Feb'y 21, 1890,	4036 Baring St., Philadelphia.
2041.	WILSON, JAMES CORNELIUS, M.D.	Jan'y 16, 1885,	1437 Walnut St., Philadelphia.
1747.	WILSON, JOSEPH M.	Jan'y 16, 1874,	1036 Drexel Building, Phila.
2137.	WILSON, WILLIAM P., M.D. . . .	May 20, 1887,	233 S. 4th St., Philadelphia.
2341.	WILSON, WOODROW, Prof. . . .	Oct. 15, 1897,	50 Library Pl., Princeton, N. J.
2220.	WISTAR, GEN. ISAAC J.	May 19, 1893,	269 Broad Street Station, Phila.
2314.	WISTER, OWEN	May 21, 1897,	328 Chestnut Street, Phila.
2343.	WITMER, LIGHTNER, Prof. . . .	Oct. 15, 1897,	University of Penna., Phila.
1884.	WOOD, RICHARD.	April 18, 1879,	1620 Locust St , Philadelphia.
2408.	WOOD, STUART.	May 19, 1899,	1620 Locust St., Philadelphia.
1762.	WOODWARD, HENRY.	July 17, 1874,	British Museum, London, England.
2290.	WRIGHT, ARTHUR W., Prof. . . .	May 15, 1896,	73 York Sq., New Haven, Conn.
2244.	WUNDT, WILLIAM, Prof.	Feb. 15, 1895,	Leipzig, Germany.
2426.	WURTS, ALEXANDER JAY	Dec. 15, 1899,	Allegheny, Pa.
1932.	WURTS, CHARLES STEWART, M.D.	Jan'y 21, 1881,	1701 Walnut St., Philadelphia.
2061.	WYCKOFF, A. B., Lieut. U. S. A. .	Feb'y 19, 1886,	War Department, Washington, D. C.

Y

1904.	YARNALL, ELLIS	April 16, 1880,	420 Walnut St., Philadelphia.
1759.	YOUNG, CHARLES AUGUSTUS, Prof.	April 17, 1874,	16 Prospect Av., Princeton, N.J.